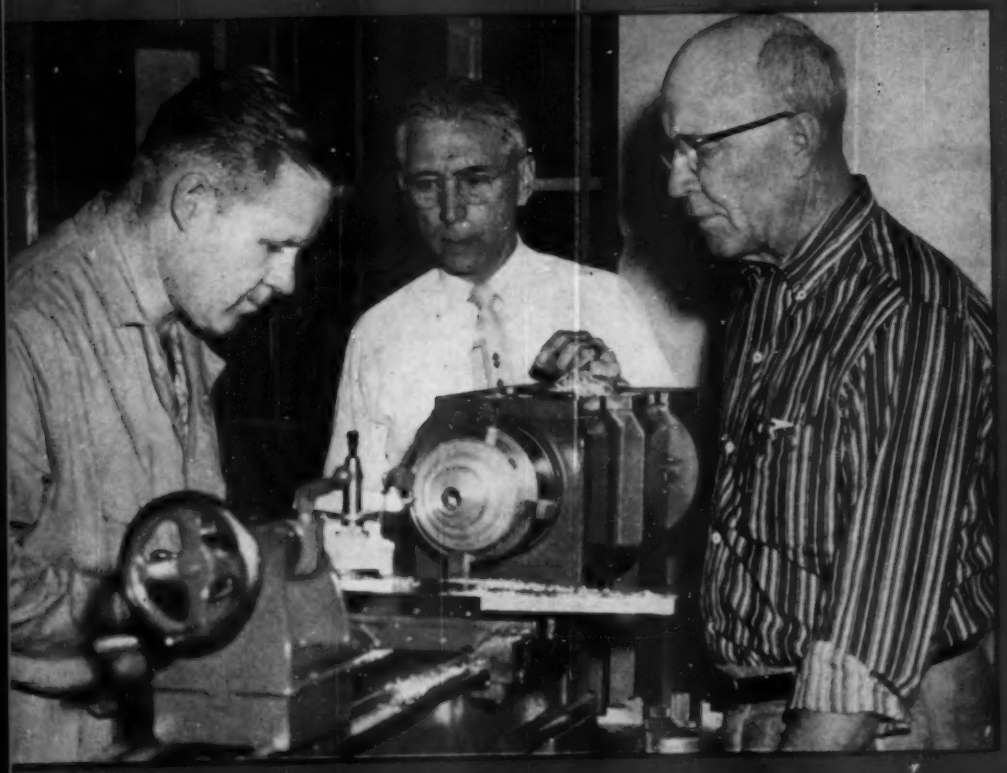
INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

IAVE



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- Technical Institute Training, Seitz
- Are We Producing Enough I-A Teachers?, Maul
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May, 1960

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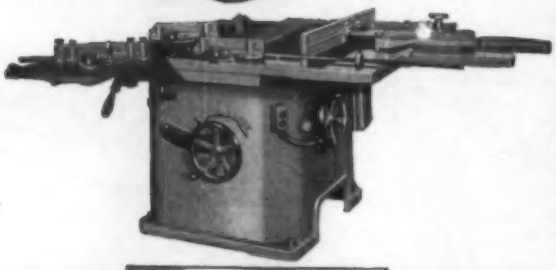

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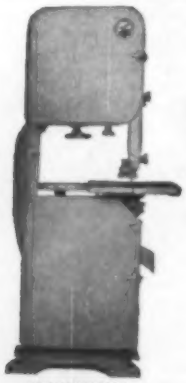

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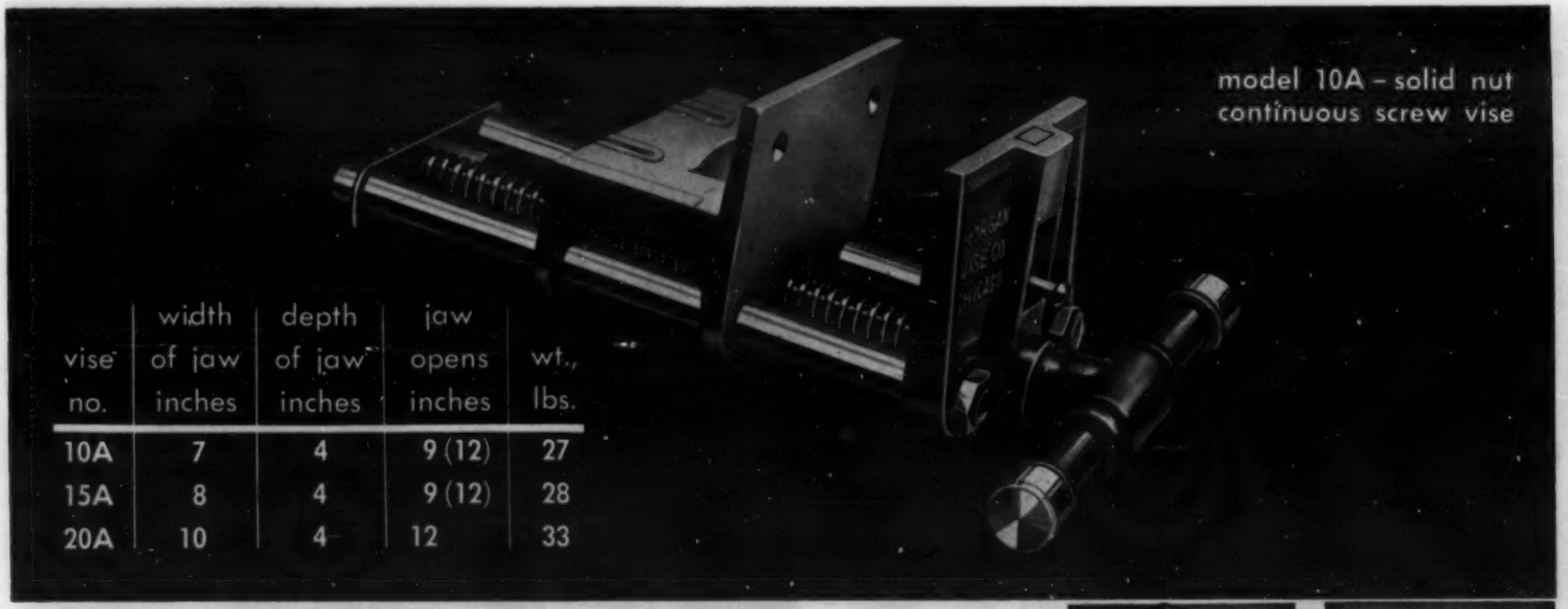

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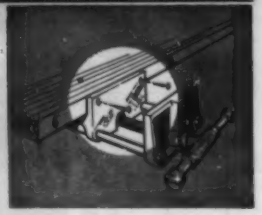

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what do you think? / both sides of a key i-e issue

SHOULD TEACHER-SELECTED STANDARDIZED PROJECTS BE USED IN BEGINNING INDUSTRIAL ARTS CLASSES?

"yes"

says Isaac P. Hampton, formerly a teacher at the West Junior High School in Parsons, Kans., and now on the industrial arts staff at the University of Florida in Gainesville.

"There are those who aver that the teacher-selected, teacher-imposed universal class project is unworthy of inclusion in any industrial arts class. In fact, the open use of this device borders on infamy and is a sure way to stifle student initiative. I wish to argue the case for the standardized project, and present reasons why it merits consideration by the average shop teacher, especially in beginning industrial arts classes with large enrollment. Admittedly, there are drawbacks to the use of this kind of project; but a tested and proven one can list the following advantages:

1. It permits arrangement and presentation of the learning experiences in a logical and sequential order.
2. It facilitates presentation of the teaching units by allowing the instructor to concentrate on those particular topics of common interest to the whole class.
3. Class demonstrations become of interest to everyone, not to just the few, and can be presented with greater economy of time.
4. Individual achievement can be more accurately measured when identical operations are performed by all members of the class.
5. In large beginning classes, the use of the standardized project permits the harassed teacher to make fuller use of such

---

Would you like to read a regular column in IA/VE presenting both sides to key questions in industrial arts? This is the fifth in a series of new ideas we are trying out for your approval or rejection. Please let us have your opinion!

---

helps as pre-cut stock, jigs and fixtures, unified textbook assignments and usable instruction sheets.

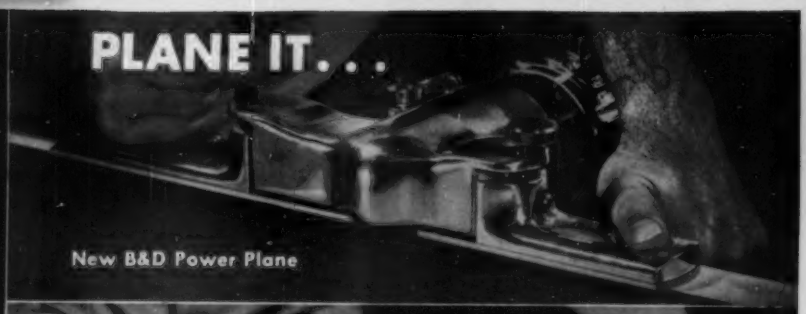
6. Materials and supplies can be ordered with more certainty as to their eventual use.
7. A smaller inventory of supplies is needed to operate the shop.
8. There is better opportunity to prepare and evaluate tests and other methods of pupil achievement.
9. The standardized project is more readily adapted to factory-type production, thus giving industrial realism to the shop program.
10. Recognition for quality of workmanship, speed, finish, etc., will easily maintain the spirit of competition within the group."

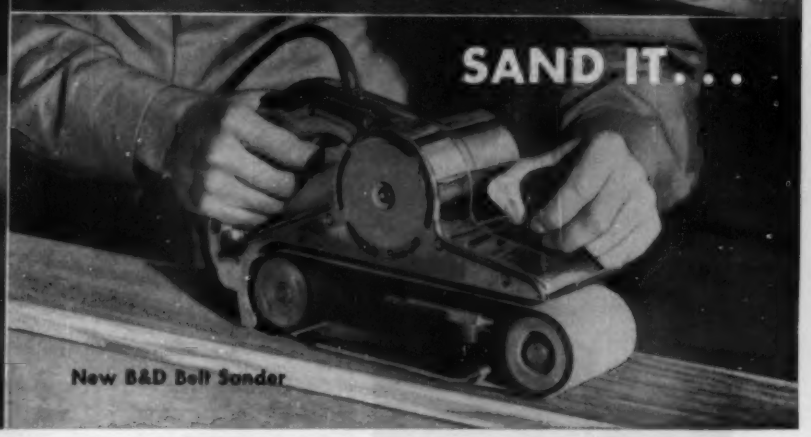
"no"

says Stanley Yamamoto of the University High School, University of Hawaii, Honolulu, Hawaii.

"The teacher-selected and imposed standardized project for industrial arts classes has definite limitations. It does not give

(Concluded on page 52)





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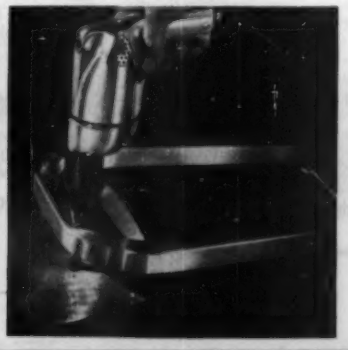

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pros and cons / an open forum for your views

questions on resolutions

A group of graduate students here at Michigan State University meet in an informally organized seminar to discuss current topics in the field of industrial education. The topic for our last discussion was the series of New Year's resolutions for the industrial arts that were proposed in your editorial of the January IA/VE (see p. 17). Several different interpretations of some of your points were presented and so it was difficult to foresee the implications of these resolutions without a clear and more detailed picture of them.

Some of the questions that were raised were:

1. Upon what research are the objectives you state based, and shouldn't this research come before we try to discover how best we can achieve them?
2. How are these national standards to be decided upon, administered, and enforced?
3. What kind of a teacher would go into or continue teaching industrial arts if he did not have some "luxury" of deciding what, how, when, and why?
4. Are the new facilities really the ones that are the farthest from any minimum standards that might be recommended?

We wondered if you would . . . clarify your position for us to further discuss and evaluate.

Lee Smalley (recording secretary), **Ralph Nelson, Ronald Baird, Edward Bergman, George Ferns,** Michigan State University, East Lansing

Thanks for your interest in the January editorial. We certainly don't have all the answers. These are for the profession to find. However, here are answers to your more specific questions:

Question 1. This question is much like the old query about which came first, the chicken or the egg. We feel that society must establish its goals and that for Americans these are well stated in the preamble to the Constitution. Let's agree that the Seven Cardinal Principles or some variation of these standards such as the Goals for All American Youth are what education is shooting for. Then let's make sure that the industrial-arts objectives contribute in some distinct way to these educational goals and in turn to our American goals. The problem, however, is *how* we are to attain these objectives, and this is where research comes in. We seem to be confused as to the "how." Are we trying to be *everything to everybody?* To some, industrial arts is largely designing and creating, to others it is the teaching of skills and to still others it is the interpretation of industry. How to reconcile these different philosophies is the problem. An illustration might be the area of general metals in the junior high school. The traditional approach is to teach hand skills in the areas of bench metal, sheet metal, and art metal. Each boy makes a cooky cutter, a lamp, and a funnel. Little or no mention is made of foundry, forging, welding, and machine shop. Another popular approach is to emphasize art and creativity. Students usually design a free-form bowl and then spend most of the remainder of the semester completing this and similar art-metal projects. A third approach might be to teach some basic concepts about metalwork. These could include something about precision measurement, mass production, interchangeability of parts, characteristics of metals, and the five basic methods of shaping metals. Are all of these approaches equally good or is *any* kind of industrial arts good as long as it is well taught? This is the question, we think, that the profession must answer through research.

Question 2. There are several ways in which national standards could be agreed upon, administered, and enforced. Organizations such as the American Occupational Therapy Association and the American Nurses Association for many years have outlined in great detail their curriculum materials. These groups utilize such techniques as national approval of education institutions, standardized tests, and certification of graduates. Your editor would like to suggest that we establish a National Curriculum Standards Committee for Industrial Arts much like the Physical Science Study Committee that developed the high school physics curriculum. This physical-science group was made up of physicists, science teachers, and educators. This new physics curriculum outlines in detail an entirely new concept and method of teaching physics. The field of chemistry has its Chemical Bond Approach Committee and biology has established a Biological Science Curriculum Study. Our group should include industrialists, teachers, and teacher educators. Others have accomplished this, why not industrial arts? Obviously we do not want to establish standards so rigid that we risk mediocrity through extreme standardization. While there may be *some* danger here, we believe the greater danger to industrial arts lies in allowing each teacher to teach what he wants, when he wants to, and how he wants to. No profession has ever suffered by raising its standards.

Question 3. You raised a question as to whether or not teachers would be happy to teach when they could not decide what, how, when, and why. Naturally, we don't want teaching to become a lock-step procedure. The choice of projects, experiments, exercises, and activities would still be in the hands of the teacher. The joy of presenting an excellent demonstration or lesson will always be there. An over-all program of good teaching is possible only when there is a carefully planned guide to follow and when instruction is well organized. Most teachers need and want direction. We should clearly mark our guideposts.

Question 4. You question the matter of new facilities and whether they are adequate. A composite of the new general shops we have visited in recent years is as follows: four-station woodworking benches, a standard set of woodworking power tools, one or two sheet-metal benches, one metal lathe, and a small bench for electricity. Are these facilities adequate for teaching general shop? We don't think so! — *J. L. F.*

oops!

In the April, 1960, issue of IA/VE you listed me as "AIAA" (American Industrial Arts Association) president when you meant "OIAA" (Ontario Industrial Arts Association) president.

O. R. Bannister

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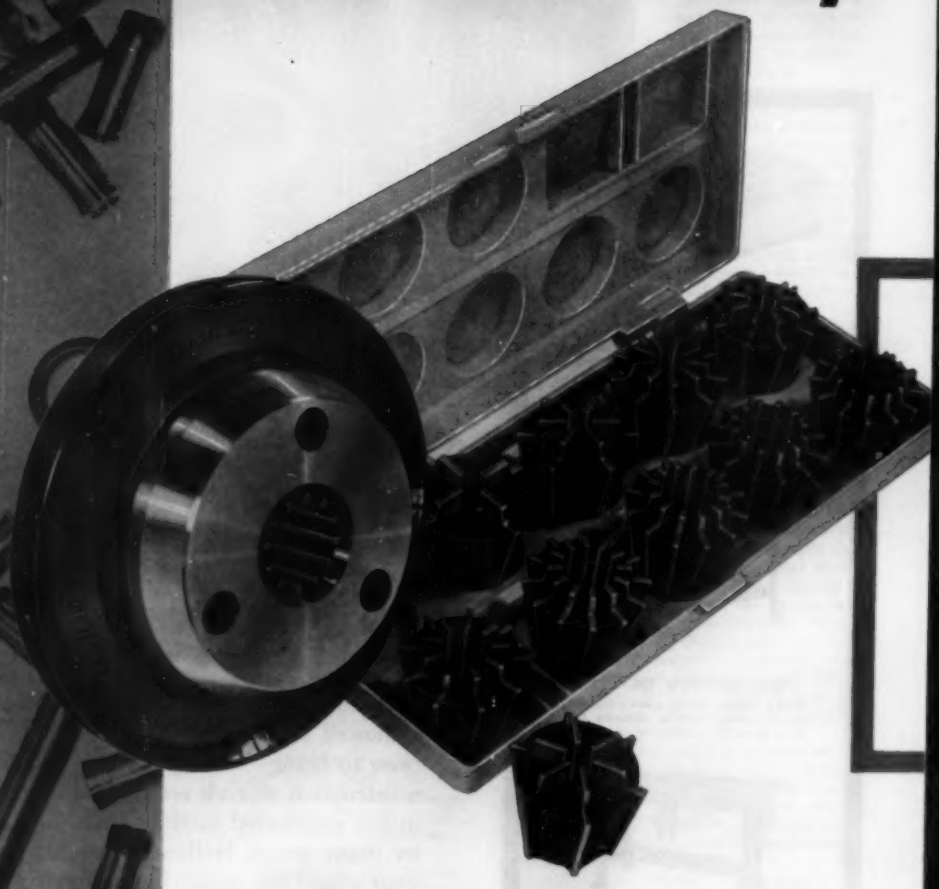

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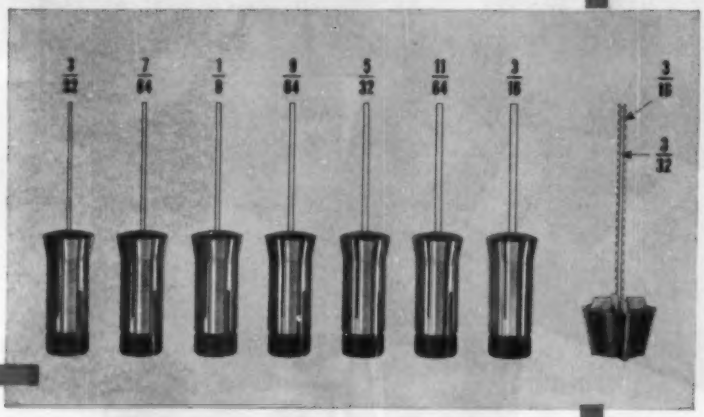

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the bulletin board / news notes and trends in industrial education

ENGINEERING ENROLLMENTS DROP

For the second consecutive year, enrollment in America's accredited engineering colleges has dropped. This fall 240,063 students registered in engineering; last year there were 249,950, and in the fall of 1957 the total was 257,777, according to the American Society for Engineering Education annual survey of enrollments in schools having accredited engineering curricula.

Under the influence of high enrollments in the mid-1950's, however, the number of engineering graduates continues to rise; in the year ending June, 1959, 41,132 degrees were given in various fields of engineering.

Total engineering enrollment in the fall of 1959 was down 4 per cent from 1958 and 6.9 per cent from 1957, according to the survey. A decrease in undergraduate enrollment first reported in 1958 continued in 1959 with a 5.7 per cent drop during the year. In 1959 engineering students accounted for only 7.1 per cent of all college students, compared with the high of 8.4 per cent in 1957.

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NEW YORK SEEKS NDEA VOC-ED FUNDS

The New York city board of education directed its administrators to determine if federal funds under NDEA can be obtained for its vocational-education program. Of special concern to the board was the inaccessibility of federal matching equipment funds for substantial programs — such as that of the Aviation High School in Queens — inaugurated just before the law was passed.

Board members Charles J. Bensley said that preliminary study indicated that the board should "advise the appropriate committees in Congress" of the need to broaden the act's provisions.

NEW I-A MATHEMATICS BOOKLET

The California state department of education has announced publication of "Mathematics and Industrial Arts Education," a bulletin designed to assist in the practical application of mathematics in each area of industrial arts in grades seven through twelve. (For more details read the review of this booklet on page 54.)

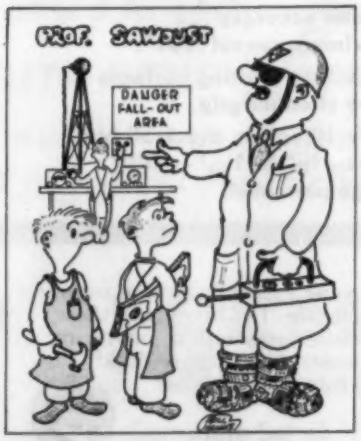
OHIO SHOP SAFETY SURVEY

The Ohio state department of education's trade and industrial education service is making a state-wide shop-safety survey of all trade and industrial education facilities. The survey, conducted once every three years, is using a form developed as a result of recommendations of the National Safety Congress. The survey will be concluded by the end of the year.

REPORT ON PRESIDENT'S SAFETY CONFERENCE

The safety challenges of our fast-changing world are basically three: "the changing nature of work; the changing nature of the work force; and the 'unchanging' nature of man. Already with us, these challenges will increase during the 1960's."

(Concluded on page 12)



"Let's observe the usual precautions during the countdown at 0900."

David Huttner

Quinton Meek

Robert Kintz

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One of the five Delta School Representatives pictured above is on your staff right now! His primary job is to assist and work with you in any phase of your industrial arts and vocational education program. Because he contacts many shop instructors, administrators, and school architects he can bring you the benefits of the latest thinking, techniques and developments. And because his background includes actual teaching experience, he recognizes and understands *your* needs. So whether you are designing a new shop, selecting additional equipment, or increasing the efficiency of your layout, you can count on his expert help.

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THE BULLETIN BOARD

(Concluded from page 10)

This statement prefaced the statement "The Challenge of Safety in a Changing World," which reported the conclusions of the President's Conference on Occupational Safety. The conference was held March 1 to 3 in Washington.

Running throughout the recommendations of the conference was "the increasing demand . . . on education and training, including safety training . . . to prevent loss through avoidable work injury."

Commissioner of Education Derthick stated that safety education in our schools involves the principles of learning that are applicable to other areas of the school program. Thus, the learning of safe behavior accrues for the most part within the scope of basic learnings, and with little additional teaching effort. Though it is possible, and at times appropriate, to view safety as a specific area of instruction, much that is absorbed in the social studies, industrial arts, vocational education, home economics, science, physical education, and other learning areas helps the student learn to live in freedom from accidents.

NEW I-A FAIR HELD

The first Western Kansas Industrial Arts Fair, held April 29 and 30 at Fort Hays Kansas State College under the auspices of the school's industrial-arts department and club, exhibited over 200 junior and senior high school student projects. Judged a success by its sponsors, the fair allowed considerable exchange of ideas among Kansas high schools and aroused interest in industrial arts.

OSWEGO I-A CONFERENCE

Dr. James R. Powell, nuclear engineer at Brookhaven National Laboratory and Dr. John Fuzak, professor of industrial-arts education at Michigan State University, are headliners of the 22nd annual industrial-arts spring conference at the New York State University College of Education at Oswego. Commercial exhibits, an "open house," and the traditional banquet greeted the conferees.

RUSSIAN PRAISES U. S. VOC-ED

After three days of visits to high schools and colleges in New York City, Genrikh Iosifovich Zelenko, chairman of the Soviet Committee on Vocational Training of the Soviet Council of Ministers, reported that he was highly impressed with U. S. industrial education.

Before leaving the city, he said, "what we have seen fully confirms our prior knowledge of the high level of . . . vocational education in the United States."

Mr. Zelenko spoke at an informal news conference at Aviation High School in Long Island City, Queens.

KODAK JUDGES NAMED

Five judges have been chosen for the fifteenth Kodak High School Photo Contest which annually brings out the best photographic abilities of U. S. high school students. The judges include: Martin Bovey, Jr., a motion-picture producer; Joseph Costa, chief photographer for King Features Syndicate; Carl Purcell, NEA photographic section chief; Margaret Whyte, publications editor of the National Council of Catholic Youth; and Peter Braal, photographic illustrations division manager for the Eastman Kodak Company.

surveying the school scene

▸ After a 28-month juvenile delinquency investigation of New York public school conditions, a Kings County, N. Y., grand jury, strongly recommended continued "close co-operation between school principals and the police" to stamp out delinquency. This was the first of 13 recommendations in the jury's formal presentation.

▸ Two thirds of the work the average teachers cover in the classroom may be done by teaching "machines" and nonprofessional assistants in the schools of the future, according to the University of Illinois' Dr. J. Lloyd Trump, secretary of the National Association of Secondary School Principals.

▸ Europeans "are looking for further public participation in the administration and management of schools and want to lessen the rigidity of their system to give greater opportunity to more students," according to Dr. Arthur S. Adams, president of the American Council on Education. Dr. Adams was one of four Americans invited to interpret education in America at the Salzburg seminar in Austria.

▸ The level of schooling among adults is higher than ever, according to a report of the U. S. Census Bureau. One half of the adult population now has 11 years of schooling, compared with 9.3 years in 1950.

▸ State Commissioner of Education in New York, Dr. James E. Allen, Jr., has proposed a modernization of state aid formulas to take into consideration the financial problems of education experienced by urban schools, such as in New York city.

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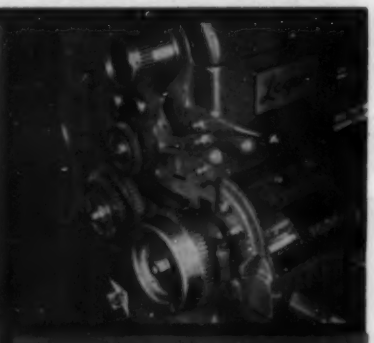
Automatic Safety Gear now standard equipment on 10" and 11" models



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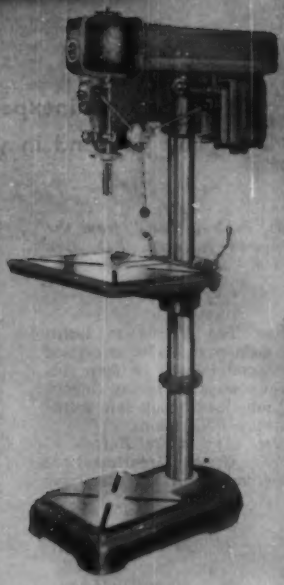

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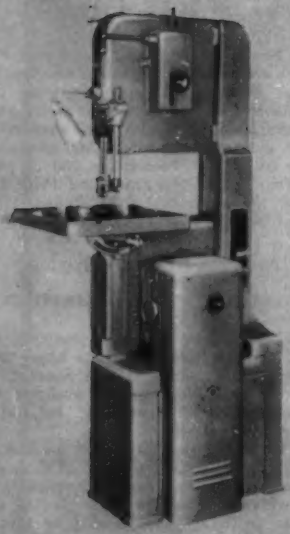

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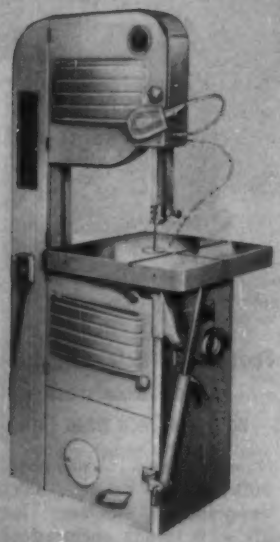

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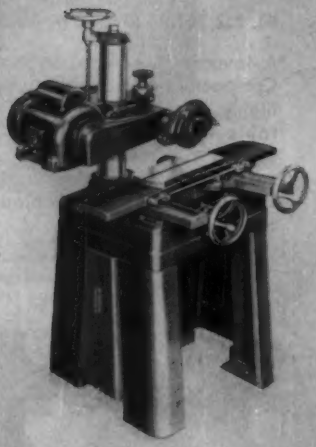

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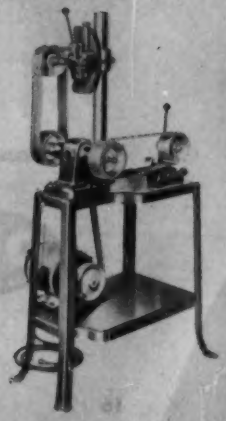

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Write for your free copy of "Hardwood Plywood: Faces, Figures, Facts" from the Hardwood Plywood Institute, P.O. Box 6246, Arlington 6, Va.

more on safety

"You're Never Too Young to Learn Safety," is an eight-page leaflet addressed to youth. Of general interest to shop students, it describes ways of saving fingers, toes, eyes, and muscles through safe working habits. Cartoon illustrations.

For your free copy, write Bureau of Labor Standards, U. S. Department of Labor, Washington 25, D. C., specifying the above title.

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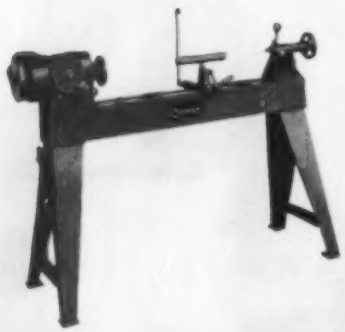

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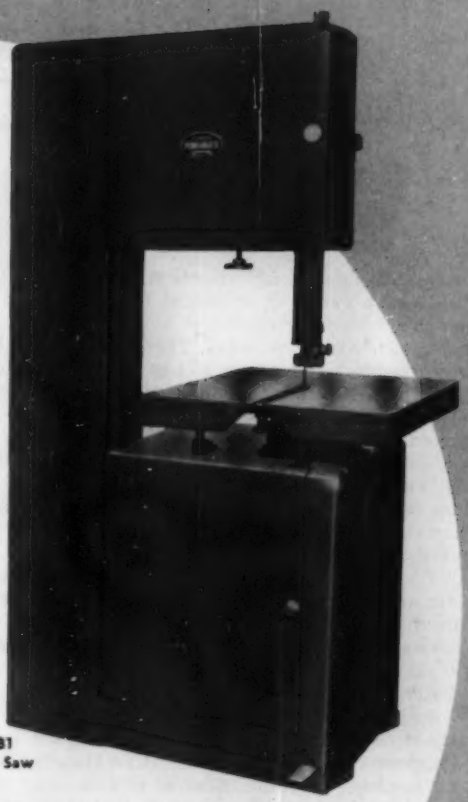

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What Did You Mean, Dr. Conant?

When an individual of educational stature such as Dr. James B. Conant speaks on industrial (or, as he calls it, *vocational*) education, the profession must sit up and take careful note of what he has to say. There is no doubt that the American educational system will be greatly influenced in the years ahead by Dr. Conant's reports on the senior and junior high school.

In a recent speech at the AVA convention, Dr. Conant made certain remarks and suggestions concerning what he called "vocational education." He readily admitted his limitations in the area by prefacing his recommendations with these words: "I am under no illusions that I can tell you anything about your own work in vocational education, and I hope none of you have any illusions that I can do so." He went on, however, to make three rather definite comments concerning this area:

1. Vocational programs should be related to the employment opportunities in the general locality.
2. Vocational education should be more concerned with the slow readers in our high schools.
3. Shop work at the eleventh and twelfth grade levels should be given vocational emphasis rather than the non-vocational emphasis found in industrial arts courses.

Let us remember that Dr. Conant is talking about senior high school shop programs, not post high school vocational and technical education. Some people in our profession might assume that Dr. Conant recommends an extensive vocational education program of the reimbursed type. Does Dr. Conant really mean that there should be many specific unit shops in high schools? Is he suggesting that Jimmy Jones should decide to become a sheet-metal worker when he's in the tenth grade and then spend half his school days in the vocational sheet-metal program in the eleventh and twelfth grades? Is he suggesting that Muskegon, Mich., have only foundry shops in its high schools and that High Point, N. C., only cabinetmaking shops? Let's hope that the answer to all of these questions is *NO*.

It seems to us that the only practical plan for shop work in the comprehensive senior high school calls for a series of well-equipped general-unit, or area, shops, including drafting, metalworking, electricity-electronics, graphic arts, woodworking, and auto mechanics-power. Isn't it true that comprehensive high schools, no matter how large, are unable to afford the space and teachers for more than six or seven shop areas?

We would also suggest that these shops be about the same whether they are located in Muskegon or High Point. Americans are a very mobile people. Many individuals will live and work at some location other than that where they went to high school. We *would* agree that each of the shops should represent a broad family of occupations; we likewise believe that the courses should be strongly oriented towards vocational and guidance objectives, at the same time retaining the general education features of industrial arts.

What would this mean for each of the shop areas? Let's take as an example the area of woodworking and outline what it should be in a comprehensive high school as to objectives, equipment, and courses. First, let's look at the family of occupations that the wood shop should represent:

1. *Carpenters.* There are 1,200,000 carpenters in the United States, the largest group of skilled workers in one trade. The opportunities in this trade are tremendous.
2. *Cabinetmakers.* There are about 20,000 cabinetmakers. We must remember that many carpenters also do finished carpentry.
3. *Painters and wood finishers* number about 425,000.
4. *Patternmakers.* While there are only about 17,000 wood patternmakers, their importance to the metalworking industry is such that they must be considered.
5. *Upholsterers, boatbuilders, and millwrights* represent many other important occupational fields in woodworking.
6. *Lumbering and the production of lumber products* utilize the services of well over half a million people.

These are the occupations that ought to be represented in a good woodworking shop. Now add to this the millions of people who are home owners and the thousands who have woodworking as a major hobby.

Should there be a wood shop in *every* comprehensive high school? Definitely yes. However, it must be much more than merely bench and machine woodworking, as is so often the case in the present high school. The shop and courses should be designed to serve: (*a*) those students who will earn a living in woodworking, (*b*) those students who will use woodworking in home maintenance and as a hobby, and (*c*) those students who will gain a better understanding of the importance of wood in our culture through experiences in this area.

Is the program that has been outlined here "vocational" education? Industrial arts? Industrial education? Perhaps the name we give to it matters little, but certainly the kind of shops, the kind of courses, the kind of teachers and the kind of students are mighty important.

What do you think, Dr. Conant?

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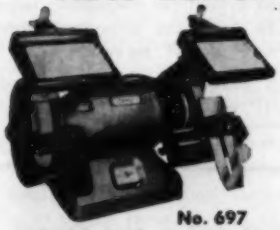

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Gilbert Hutchings, Assistant Professor,
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IS OUR TERMINOLOGY GETTING US DOWN?

What are good definitions of the following: vocational education, industrial education, industrial arts, trade and industrial education, vocational-industrial education, vocational guidance, technical education, practical-arts education, manual arts, and shop?

These are only a few of the terms that appear regularly in our literature. However, there doesn't seem to be much agreement as to their correct definitions. Some of our leaders place their own personal interpretation on these terms. Others define them in a way so vague that they are meaningless. For example, one of our leading professional texts defines "practical-arts education" as follows: "The major purpose of practical arts education is to develop basic skills in and understanding and appreciation of, useful or practical arts." The term "technical education" is defined in one booklet as "the education of one who spends more than one-half of his time in tasks that are mental rather than manipulative." In another state publication, the same term is given such a long and complicated definition that even a "Philadelphia lawyer" couldn't decipher it!

Much of public misunderstanding of education is due to our inability to communicate successfully. We seem unable to explain our programs satisfactorily to school boards, businessmen, and parents. In much of our communication we fail to recognize the true importance of clearly defined terms.

The defining of terms isn't a simple or easy job. Many a conference has failed because the group didn't take time to define terms or else the members could not reach a compromise agreement on definitions before discussion started. Your editor served recently as consultant for a workshop of English teachers in technical schools. What was the hardest task for the group to complete? You guessed it! The conference members spent the first half day trying to agree on a satisfactory definition of the single word "English."

While it is a difficult assignment, we believe that the profession should make the effort to reach national agreement on terms. We believe that our hand could be greatly strengthened if we all "taught the same language." We certainly are in need of a set of definitions that are clear, concise, and self-explanatory. We would like to suggest the following guide for the definitions in our field:

1. Eliminate educational gobbledegook.

Education has developed a jargon all its own that is understood only by other people in education. Parents and the public in general resent our use of "high sounding" terms and six- or seven-syllable, block-busting words. A direct quotation from an education booklet here might emphasize this point: "Prior to becoming fully cognizant of the educational implications of attempting to evaluate the educational concompetents, we must structure our programs around the problem solving needs of the whole child." What does that mean?

2. Avoid careless use of abstract terms.

Such words as "attitudes," "beliefs," "values," can be understood only if they are explained by concrete examples. By themselves they are meaningless.

3. Refrain from falsely identifying things based on words alone.

Many trade schools are changing their names from "vocational schools" to "technical schools." Why? Because, in the public mind, we have built up an association of the word "vocational" with dumping grounds or juvenile delinquency. In education, as in government, we must avoid guilt by association.

4. Avoid judging things in terms of all white or all black.

The word "training" is a good example of this. Not too many years ago it was quite acceptable to offer a "teacher-training program" supervised by a "teacher trainer." Then, some bright young educator decided that "we train animals but we educate people," and now the word "training" is *all black* in many educational circles even though industry continues to operate training programs *as such*.

It seems to us that it's the responsibility of our national professional organizations to get together and agree on these definitions. If this is done, then it's the duty of all of us to *use these definitions* when we explain our programs to the public.

John L. Feirer

Progress and Problems of Technical Institute Training

JAMES E. SEITZ

— Temple University Technical Institute

A frequent topic today is the release of more creative engineers from work that can be performed by persons with less education.

The crux of the problem this suggests lies not so much with the engineer as it does with his replacement, for the engineer can be advanced under ordinary circumstances only when a properly trained technician is available to relieve him. An increasing number of companies are giving attention to this problem. As they do, the need is pointed up for more qualified technicians. How pronounced the immediate need might be is uncertain, but future needs are likely to become more acute due to the additional demands which parallel normal industrial growth and expansion.

How can the needed technicians be prepared? Inasmuch as an ordinary

Dr. Seitz is a lecturer in mechanical design technology at the Temple University Technical Institute, Philadelphia.

high school education leaves the individual unqualified to deal with certain basic engineering principles, some form of special training is imperative. On-the-job training is given employees in some instances when the work is rather routine, but even when so, time and cost are often considerable factors. Some companies find it is more profitable to provide training under special instructors after working hours within the plant. Others encourage attendance in nearby schools. Where a suitable school is accessible, industry seems to prefer that employees avail themselves of the training offered there rather than resort to one of the other training methods.

Various incentives are used to induce employees to further their education. The most common is the promise of pay increases. Besides this, many companies go so far as to foot the bill for part or all of the tuition. For some companies this practice is unfeasible; consequently, they must compete in the employment market for technicians having previous experience or formal education.

Awareness to the Need

Technical institutes have been specifically set up to supply engineering assistants, but as yet they are sparsely located and there is indication they cannot produce the necessary graduates. The twenty-sixth annual report of the Engineers' Council for Professional Development states there are 36 *accredited* technical institutes. This is about one fourth the number of engineering schools. It is not likely, therefore, that the ratio between technicians and engineers will reach balance for some time as the most conservative estimates indicate that an average of two technicians are required for each engineer if personnel are to be utilized efficiently.

There is one promising note: the number of technical institutes is increasing. In fact, the increase is quite a bit more rapid than the number accredited would seem to indicate. New York and Florida provide examples. In these two states an effort is being made to determine regional needs and locate new schools accordingly. Accreditation must necessarily follow establishment, hence, it alone is not a true indication of the growing number of such schools. Nevertheless, a trend is present which must continue for some time if critical shortages similar to those which hampered industry in the past are to be averted.

Despite the awareness of some, there remains an appalling lack of knowledge about such schools. This is true not only of some industrial representatives who work with or employ technicians but also of some high school teachers whose obligation it is to prepare students for future study and work. Personal contact with such persons reveals that a few have no idea of the purpose of technical institutes. Where there is some knowledge it is often rather superficial. Of course, much of this is due to the fact that this type of school is relatively new.

It is unfortunate for youth, however, when a counselor can reveal he had no knowledge of technical institutes whatsoever, even though one such school existed virtually only a short distance away. How many capable students might there have been who didn't have the financial means to attend a four-year college that otherwise might have been able to afford a two- or three-year technical education? How many more might there have been who because of latent abilities, hidden or unchallenged aptitudes, poor study habits, or nonacademic high school training were told there was no place in post-secondary education for them? Or how many might have obtained the necessary mathematics and science background in high school in preparation for later technical institute training had they known about it early enough? To attempt to answer these questions would be sheer speculation. But the implications for the counselor, as well as the high school industrial educator, should be evident.

- **The need for technicians or engineering assistants in industry today is a national problem. Designed to train technicians are post-high school, two-or-three-year technical institutes usually at the junior or community college level.**
- **For teachers and counselors who can channel suitable students into this program, here is a report of the purposes and objectives of technical training institutes, with reference to a typical program.**

Purpose and Objectives

Generally the technical institute is a post-high school institution at the junior-college or community-college level that trains persons to assist graduate engineers in various phases of design, production, and distribution. With few exceptions, the program offered is of two or three years' duration. It usually entails an intensive study of engineering subjects, and rather than follow a trade-school type of program which emphasizes manual skills, the objective is to place graduates in the area between the skilled worker and the professional employee. Graduates so trained have been classified variously as: machine designer, research technician, test engineer, layout draftsman, field representative, technical writer, or simply assistant engineer.

It is not without importance to note that beginning technicians command a respectable salary. National averages indicate starting pay is from $85 to $90 per week. Some localities are considerably above this amount with weekly pay being $120 to $125 for many of the superior graduates.

As to the qualifications of the technician, a specific statement cannot be made. It is likely there are considerable variations. For one thing, little has been done to date to standardize the amount, type, level, and nature of the course offerings among the schools. Moreover, regional demands are sometimes so inherently different and such profound controlling factors that they lead to unique programs unsuited elsewhere. Even a school's name may be a misleading clue to the type of training given.

The Technical Program at Temple

Although differences do exist, some idea of the technician's training can be had by considering the program at Temple University. No inference is intended here that this program is typical even though in some respects it may actually be.

The five curricula which follow are offered at Temple in the day program (these are also given in the evening division plus additional studies in dairy procedure and metallurgy).

1. Air Conditioning, Heating, and Refrigeration Technology

CURRICULUM FOR MECHANICAL DESIGN TECHNOLOGY

Subject	Hours per Week	Credit Hours
First Semester		
Technical Mathematics	5	5
Physics	3	3
Applied Drafting	6	3
Graphic Statics	3	2
Materials and Processes	3	3
Basic Chemistry	2	2
Second Semester		
Technical Mathematics	5	5
Introduction to Machine Design	6	3
Mechanics	5	5
Elements of Mechanism	3	2
Physics	3	3
Third Semester		
Machine Design	3	3
Kinematics	3	3
Applied Machine Design	8	4
Strength of Materials	4	4
Industrial Orientation	2	2
Electrical Applications	2	2

Subject	Hours per Week	Credit Hours
Fourth Semester		
Tool and Die Design Theory	3	3
Tool and Die Design Drafting	4	2
Plant Layout and Automation	5	4
Materials Testing	3	2
Structural Design	4	4
Technical Writing	3	3
Fifth Semester		
Written Communications	3	3
Personal Finance	3	3
Industrial Design	3	3
Personal Psychology	3	3
American Social and Economic Development	3	3
Elective	3	3
Sixth Semester		
Law of Business Contracts	3	3
Periodical Literature	3	3
Mechanical Design Seminar	3	3
American Political Institutions	3	3
Electives	6	6

2. Architectural Design and Building Construction Technology
3. Chemical Technology
4. Electronics Technology
5. Mechanical Design Technology

The average number of class hours per week is 22 with laboratory work generally comprising less than one third of the total. Credit hours average 18 in each standard 15-week semester. The schedules concentrate courses in the last two semesters about the humanities.

Achievement is measured one of two ways. Students successfully completing six semesters earn the degree "Associate in Technology." Those terminating studies at the end of four semesters may receive a "Certificate of Proficiency" if the work done has been satisfactory or better. This applies in general in the evening division, too, but more semesters of attendance are required there as students are limited to enrollment in three classes per week. Course offerings and content also vary somewhat.

Finally, a brief consideration of a typical subject in the curricula might be necessary to present the true picture. Technical mathematics, for example, embraces trigonometry, algebra, geometry, and the like up to calculus with emphasis on log and slide-rule applications. Problems selected are those most appropriate in the study of mechanical design or electronics as the case may be. The idea is to have math and all the other subjects concentrated about one core, thereby trimming as much unrelated matter from each curriculum as possible. It is evident, then, subjects such as physics and technical writing listed under "Mechanical Design Technology" would be taught with different emphasis than subjects of the same title given in other curricula.

Continual Revision is Needed

Continual revision of subjects, hours of study, etc., is made at Temple under the direction of Associate Dean James J. Crawford with the directors and faculty members concerned. Representatives of industry also contribute. In fact, some rather significant changes have occurred at their suggestion. One such has been the inclusion of chemistry as it pertains to inorganic matter related to the field of mechanical design. Another being contemplated is the replacement of structural design with fluid mechanics. Undoubtedly more changes in the future will be made upon suggestion of persons who are in position to survey industry's needs firsthand, for, above all, cognizance of the trends and demands of industry is considered imperative.

vocational instructors and effective job placement

M. S. THOMAS

- In too many cases the most **overlooked** of the five main phases of vocational guidance is **job placement.**
- Here are ten ways in which **vocational instructors** can ease the **students' transition** from school to work.

We who are engaged in vocational education must agree that the final test of vocational training is found in the future living of the individuals we train. The successful placement and job adjustment of vocational school graduates are vital phases in preparing young people for successful living and effective citizenship.

In his book, *Vocational Education: America's Greatest Resource,* John A. McCarthy[1] has ably pointed out that there are five main phases of vocational guidance: (1) the study of occupational fields, (2) exploratory experiences, (3) vocational preparation, (4) placement, and (5) job adjustment.

This fourth phase — placement of young workers in the new world of work — is one which urgently needs consideration. In relation to this phase, McCarthy states:

"This phase is often overlooked because the school board and its representatives feel their responsibilities do not extend beyond the school program. In some instances guidance personnel recognize the importance of placement, but it is passed over because there are no funds available to provide the facilities and personnel necessary to place youth in their first job. . . . There are some who feel this is the responsibility of the state or other employment services, but to leave this important job to an agency outside of the school system is to avoid a responsibility for the placement of the product of the schools in a market for which it was intended. No manufacturer can continue in business unless he sees to it that the product of his plant is placed in the market for which it has been planned and produced."

Robert Hoppock, Professor of Education at New York University, and Nathan Luloff, Head Counselor, Metropolitan Vocational High School, New York, say that: "The backbone of school placement always has been and perhaps always will be the personal contact of instructors with employers, and the energetic application of students themselves to the problem of finding a job."[2]

Thus, since so much is involved in preparation for placing students on a job, it is well to give some thought and study to it early in the school year rather than at the end.

Dr. Thomas is director of the Vocational-Technical Institute at Florida Agricultural and Mechanical University, Tallahassee.

Few Programs

In many schools today a complete vocational guidance program, including placement services, is nonexistent. Others are providing some guidance services but have not developed to the point where an organized placement service is included. Certainly, each vocational instructor, after helping a student select and prepare for an occupation, ought to assist him in finding a suitable place in which to work.

At a meeting in Miami, some 75 trade and industrial teachers suggested these ways for teachers to help students in transition from school to work:

1. Establish and maintain a close personal relationship with the workers in industry in their field.
2. Since every able bodied young man must serve a period of military training, help him plan his career with this in mind. In many cases he will be able to further his training while in service as well as be able to enter a job successfully when he leaves.
3. Set up craft and/or advisory committees using the leading people in your community in your field. This is good public relations and they can help you in the placement of your graduates.
4. See that extensive occupational information is provided students, particularly pertaining to job opportunities. This may be done through the guidance counselor, library, shop or classroom.
5. Have school put on mailing list for announcements of civil service examinations. Encourage students to take these examinations.
6. Establish close working relations with State Employment offices.
7. Keep active in professional organizations. Through these you may gain helpful information as to job opportunities, occupational trends, etc., as well as share in the overall responsibility of selling Vocational Education.
8. Keep good, complete records of students: personal data, scholastic achievements, anecdotal record, personal qualifications, and assets.
9. Make and publicize periodic reports of full-time and part-time placements.
10. Give students training in techniques of *how* and *where* to apply for jobs.

[1]John A. McCarthy, *Vocational Education: America's Greatest Resource.* Chicago: American Technical Society, pp. 112–113, 1952.

[2]Robert Hoppock, Nathan Luloff, "National Society for the Study of Education," *42nd Year Book, Part I, Vocational Education.* University of Chicago Press, p. 96.

reactions to

at industrial arts

▶ In your IA/VE for April (see pages 14 and 15) Dr. Duffy of Montclair State Teachers College in New Jersey suggested **a multileveled program** to achieve a new interest in industrial arts.

▶ Here are **several reactions** to this program. . . . After reading Dr. Duffy's suggestions and these comments, we would like to know **what you think** about the value of such a program!

"a real concern for the serious predicament"

Delmar W. Olson

professor of industrial arts, Kent, Ohio, State University

I like Dr. Duffy's proposal especially because it shows a real concern for the serious predicament into which we in industrial arts have slid.

Industrial arts is not only losing the college-bound student, it is losing students on all levels. Percentagewise enrollment is decreasing at a rather sharp rate. This is due primarily to the fact that industrial arts does not make enough educative good sense to command the necessary respectability. But we try to put the blame on an overemphasis of some other fields.

It is time to take stock of our predicament. Ten years from now will be too late.

I see Duffy's proposal as one step in the way out of our dilemma. The first is the establishment of a profession-wide, bold, new concept of industrial arts as the study of the technology. The second is the development of a curriculum based on the technology. Then comes Duffy's proposal as one of several means to effecting the new program.

If industrial arts will reflect the spirit of the technology, it will emphasize intellectual excellence and employ student research, experiment, design, and invention in project development as Duffy recommends. An industrial arts based on this concept will attract the superior student. It will influence more students toward college; and at the same time, it will draw on the full capacity of the other students and result in a level of individual growth and development unattainable with traditional methodology and subject matter.

The way out will not be easy. But if we will think imaginatively, as Duffy is doing, with a willingness to cut ourselves free from the straight jackets of traditionalism, we will find a glorious future in humanitarian service.

"best operated in a large high school"

M. J. Ruley

supervisor of industrial arts and vocational education, Tulsa, Okla., schools

The article, "A New Look At Industrial Arts," by Dr. Duffy has a great deal of merit. The statement that industrial arts courses are not challenging the more able students is correct to a certain degree; however, where leaders have been able to schedule special groups, accelerated classes in industrial arts have and are being offered.

In Tulsa, courses in pre-engineering drawing and basic electronics have been established in two of our senior high schools, and in our second year of operation we find that we are better prepared to challenge the more able or college bound students with these courses. Advanced courses in drafting, radio, and other of the more basic industrial arts offerings that have been revitalized are meeting the needs of the college bound student. Many of the colleges and universities are suggesting to high school students that they take courses in drafting and shop work as they will be unable to take engineering shop work at the college level. We, in Tulsa, have been able to get such a statement incorporated in our guidance counselors handbook.

Such a program as advocated by Dr. Duffy can best be operated in a large high school where industrial arts courses can be established to meet the abilities of the groups that he proposes. In small schools such grouping or scheduling is almost an impossibility. We should keep in mind that only the top 25 per cent of our students are able to handle accelerated programs of science and mathematics, and yes, of industrial arts. In fact, I am told it is only about ten per cent who should actually be enrolled. If this is the case, we should be more concerned with the large average group where we have for years found our cheering alumni.

As a case in point, administrators are continually asking industrial arts departments for courses for the not so able, the lower 25 per cent.

Industrial arts leaders and administrators should re-evaluate their program of industrial arts and see that the offerings at the junior high school level are those of an exploratory and "tryout" nature rather than one semester and year courses in a particular area with more of the same offered at the high school level.

Teacher education programs should be re-evaluated in terms of preparation required for teachers of industrial arts. Many graduates are not adequately prepared to handle accelerated programs of the type that should be made available to the more able students.

Information should be made available to administrators, counselors, and teachers as to the specific contributions of industrial arts to the general education of all students. Efforts should be made to require a year of practical arts for high school graduation. Reasons for such a requirement should be valid and convincing.

Dr. Duffy has presented a challenge to those of us in industrial arts education and we should make every effort to give educational leadership to all phases of education and, more specifically, industrial arts education. ◀

"reflects a somewhat defeatist attitude"

William J. Wilkinson

director of the industrial arts department, Nether Providence Public Schools, Wallingford, Pa., and second vice-president (classroom teachers) of the AIAA

In reading "A New Look at Industrial Arts" by Dr. Joseph Duffy, I feel that he reflects a somewhat defeatist attitude. Many arts programs of an industrial nature are challenging to students. The great problem is time. These pupils of academic ability have to take state required courses. Their school day is a complete schedule of studies that must be taken in order for them to qualify for college entrance. Just as the pendulum of education is now swinging toward more courses in science and more courses in mathematics, a few years ago the emphasis was on reading. Perhaps we should strive to meet the demand for engineers but also remember that there is a need for technicians.

As soon as administrators decide to re-evaluate the requirements for college-bound students, guidance personnel will be in a better position to direct pupils into the industrial arts program. The multi-level approach is not new to some junior and senior high schools. However, faulty programming and overcrowded conditions have prevented others from having these academic pupils benefit from exposure to a good industrial arts program. Maybe responsible people should take a "New Look."

We do not have to educate or convince the *parents* that we can teach more than the skill necessary to construct a simple project. It seems that those who are making the class schedules, need enlightenment or a longer school day. Let us not take a defeatist attitude but keep talking for the programs we know will offer the most to our pupils. Sooner or later, the right people WILL listen. ◀

"some excellent results are being achieved"

John Friese

retired professor of industrial education, Pennsylvania State University

I have read Dr. Duffy's article, "A New Look at Industrial Arts" with warm interest and general approval of its timeliness.

It is true that industrial arts has lost ground in some senior high schools recently among students of average or above-average abilities. In other schools, with industrial arts teachers alert to the rapidly changing interests and needs of both youth and society, some excellent results are being achieved. For example, the writer recently saw a school where the principal was encouraging the brighter students to enroll in electricity and electronics. In another school a small class in pre-engineering drawing is operated each year for selected students.

At the other extreme our population explosion has resulted, in many senior high schools, in larger percentages and numbers of the slow learners appearing in industrial arts classes. This factor, too, adds to the urgency of reassessing our work for this ability group.

The author is discussing industrial arts in senior high schools where it is on an elective, personal-interest basis as is art, music, journalism, and advanced sciences. It retains the "arts" concept (for individuals) rather than bodies of exact industry or science. It is not a vocational industrial preparatory curriculum. If its *chief* aim is to assist in vocational preparation, it should honestly fly that flag, not the one for industrial arts. It *may*, however, have limited depth in motor skill, if the work is done for avocational ends and personal interests. It *should*, I judge, have depth somewhere (depending upon a student's ability) in order that he may experience the psychological satisfaction that comes only from superior achievement, for him. This is likewise a general need of our society in its varied activities.

While industrial arts has done much in selecting, classifying, and organizing curriculum experiences, generally it has not carried this work forward, whether assigned or creative, to its ultimate usefulness. It has generally not classified course materials and curriculum areas on the basis of required junior high school offerings and elective senior high school work. Neither has there been the diligent work needed in developing classifications of difficulty of (*a*) different shop areas and (*b*) different learning ability levels. These are the valid and timely concerns of Dr. Duffy.

This writer would like to make one minor suggestion in the interest of simplification. The four "levels" of ability referred to in the article are most logical. Because distinctions in instruction called for here must be achieved through various types of student and shop organization, frequently in classes with students of mixed abilities, it would appear from an organizational standpoint that the author's two upper levels of learning ability could well be combined. This would then require instruction for three levels of expected performance. We would strengthen our position through any mode of ability grouping in senior high schools. (In passing, how many professional books bearing the words "senior high school" in their titles have appeared in the last quarter century? We are not alone!)

It is likely that a variety of developments in industrial arts in this direction are under way, more than can come to the attention of a single person. It would be very helpful if we could know more of the variety of ways in which this work is being accomplished by progressive teachers. Dr. Duffy's article should stir all of us. ◀

"we need to support the comprehensive high school"

G. Harold Silvius

professor and chairman of industrial education, Wayne State University, Detroit

I am indeed happy for the opportunity to react to what is being advocated by Dr. Joseph Duffy in his article "A New Look at Industrial Arts."

First, I fully endorse what I think he is advocating to have a "multi-leveled program." May I quote from one of my recent articles to illustrate what I think the aims should be for industrial arts in elementary schools (kindergarten through sixth grade), for industrial arts in junior high schools, and for an industrial education program at the senior high school level:

Kindergarten Through the Sixth Grade

Industrial arts in the kindergarten through the sixth grade should provide the opportunity for all children to express themselves *creatively* and learn about different materials by constructing two- or three-dimensional projects. Such activities should be closely correlated with the basic units for elementary education so that

(Concluded on page 52)

▶ how industrial arts fits
into the "scheme" of general education —

Industrial Arts and General Education

S. L. COOVER

The primary purpose of education has been, is now, and we assume will continue to be, training for American citizenship. General education is, therefore, training for citizenship in our industrial democracy. It includes all of the things that the average person needs to know and the common skills he has to acquire in order to live successfully in our atomic-space age. It is important to realize that our technical age is different from any that preceded it.

Industrial arts as a part of general education is concerned with the development of an intelligent understanding of our modern industrial civilization.

Boys and girls are given an opportunity to learn practical applications of language, science, mathematics, and history. They also have an opportunity to form desirable lifelong habits and attitudes in the areas of:

1. Careful planning;
2. Working safely — with oneself, others; with materials and tools;
3. Working co-operatively;
4. Cleanliness and good housekeeping;
5. Respect for authority;
6. Respect for property;
7. Respect for work — do you respect persons who work with their hands?
8. Honest workmanship; and
9. Understanding how man creates value from raw materials to finished product.

What are some of the other reasons that industrial arts is such an important part of general education? It is developmental in nature. It develops both the mental and the physical side of a person's life. It is not necessary to tell you that the boy who cannot run and play does not develop normally. Industrial arts is a standing and doing subject. It is not a sitting and listening subject. The boy or girl learns only in direct proportion to his or her participation. Imagine learning to play baseball by listening to some teacher lecture about it.

Industrial arts holds the mirror up to life better than most other subjects because:

1. It promotes problem solving; and
2. It provides for co-operative work similar to life situations. (Co-operative work in most other school subjects is called cheating.)

Industrial arts teaches the correct and skilful use of tools. The civilization that uses tools most successfully in the next 25 years is the one that will survive.

The term "industrial arts" implies art. We must add good design to our projects. This is perhaps one of the most important phases of consumer knowledge. Art and good design are also integral parts of general education.

Industrial arts provides for student self-evaluation.

Industrial arts provides for self-expression. How many of us can express ourselves in art, music, drama, etc. And yet every boy and girl needs to feel the thrill of creating something with his own hands.

General Education and the General Shop

In further defining our place in general education, let us consider the development of the "general shop" as an important influence on the contributions of industrial arts.

While the general shop was perhaps one of the best ideas ever conceived about school shopwork, it did have a few basic faults. It was started at the seventh-grade level when it should have been started after the students had learned to read blueprints and to use the common hand tools. For example, a seventh grader can hardly be expected to make a radio set or build a motor. Yet he could do both of these things at the ninth-and tenth-grade levels.

In the 1920's there were no instructional materials and literally no good textbooks in industrial arts. Hence, the teacher had to make his own instructional materials.

The comprehensive general shop instead of the unit general shop prevailed.

All of these things made it impossible to hire a teacher to run a comprehensive general shop.

As you all know the trend now is toward general wood, general metal, graphic arts, and general electricity. You know that a teacher might succeed with sheet metal, cold metal, foundry, and machine shop while he would surely fail with wood, ceramics, and graphic arts as the units.

There is a further trend toward teaching drawing and blueprint reading before shopwork is attempted. A person cannot study history or geography until he has first learned to read. Likewise, a person cannot work profitably in a shop until he can read and interpret blueprints, and until he can make and dimension simple sketches.

Our Need for Developing Skills

Industrial arts has made progress since 1920 but it could have made much more had it not been for one basic and fundamental error. Their misconception concerned the place and function of skill in industrial arts. They contended that skill was of minor importance and by this contention retarded good industrial arts programs by at least 20 years. They failed to realize that *skill* is the carrier wave for all of the other objectives of industrial arts.

After having taught industrial arts for 40 years and after having observed industrial arts being taught by hundreds of others, I can say emphatically that, "If you do not teach a skill, you do not teach anything."

Plato said, "What is honored in a country is cultivated there." The United States is unique in that it honors craftsmanship more than any other country in the world. When our pilgrim fathers came to America, they brought with them carpenters' tools, looms, printing presses, and blacksmith tools. From 1620 to 1959, from Paul Revere to Henry Ford, craftsmen have been among our most influential citizens.

Can one be truly educated in this age and unacquainted with the processes, the materials, the organization, the trends, and the social meaning of the age of technology? ◀

Dr. Coover is director of the industrial arts department at State Teachers College, California, Pa.

- In elementary schools **industrial arts can become an "extra hand"** to help grade teachers do a better job.
- Here is a report of one experience in which fractions, scale, and early life in Greece — involving math and social studies learning situations — became **more meaningful** to sixth graders because of **integrated I-A activity.**

Our Class in Scale

RICHARD F. DOUTT

When most people think of industrial arts they tend to associate it with junior and senior high schools. Today industrial arts has taken the big step down into the lower grades, not to be taught as another subject, but rather as an extra hand to help the teachers do a better job of the things they are already doing.

One such experience grew from a sixth-grade arithmetic unit on fractions and scale. Enthusiasm carried over into the social studies unit on early Greece and finally culminated in a construction activity and field trip.

This activity helped to make fractions, scale, and early life in Greece meaningful to each sixth-grade student in the class.

Vitalizing Fractions

Fractions and other arithmetic experiences may become lifeless drudgery when pressed to great length without the revitalization and added stimulation of application to a project. Extra stimulation this time came through an activity called "scale drawing." Fractions lived, grew, and thrived, resulting in pupil enthusiasm as first hand meaningful experiences were provided.

Our scale work project developed from the exploratory interests of children themselves. A rather simple regular lesson in arithmetic, one page of insects in scale, and a few problems, provided the springboard for questions, hypothesis, and theories expanded on scale and its possibilities. Introduction of scale work afforded us a tremendous opportunity for real teacher-pupil planning — a planning experience that helped to insure a better quality and intensity of learning because of greater student interest and motivation.

"Why can't we draw something to scale?" was soon a paramount question. As a result, the following outline was developed during a teacher-pupil planning session.

Scale Drawing Unit

I. The sixth grade room 145 will be the scale drawing project.
II. Rough Sketch
  A. Items to be included in scale drawing.
    1. shelves
    2. windows
    3. rooms
    4. doors
III. Measurements
  A. For the items in Part II
    1. Shelves
      a) workroom
      b) classroom
      c) storeroom
      d) office
    2. Windows
      a) between the classroom and workroom
      b) outside windows
      c) between classrooms, workroom, and office
      d) entrance door windows
IV. Scale or Scales
  A. To be decided later by a planning committee.
V. Master Plan
  A. This will be the final drawing.
VI. Details to be included in the scale drawing.
  A. To be decided later by a planning committee.
VII. Tools to be used for measuring and drawing.

Mr. Doutt is with the University School of Northern Illinois University at De Kalb.

A. yardstick
B. meter stick
C. ruler
D. paces
E. floor tiles
F. wall cement blocks
G. architect's scale
H. plastic angles
I. protractors

The actual scale to be used, after completing all measurements on the rough hand drawing, developed into a very extensive topic for discussion. A few children had difficulty grasping the word "scale" and understanding how 1 inch could equal 1 foot or even 10 feet. A rather wide range of possible scales ($\frac{1}{16}'' = 1'$ up to $1'' = 5'$) were placed in the hopper for a class committee on scale to evaluate. This committee took a great deal of time discussing the issue and determining the most practical scale or scales to be used. The following conclusion was reached. "The committee on scale has found these scales the most practical and recommends members of the class to use one of the following, $\frac{3}{16}'' = 1'$ $\frac{1}{4}'' = 1'$ or $\frac{1}{2}'' = 1'$."

The drawings took approximately three to eight days for completion. This indeed had been a worthwhile project and activity! This proved a hasty decision on my part. As the class moved into a social studies area, "scale" again came into the group's thinking.

From Fractions to Construction

"How about building a Greek house to scale?" they asked, as we developed our unit on Ancient Greece. Items mentioned in this project included ancient weapons, boats, furniture and wall tapestries.

These projects were possible to do within the structure of our classroom but we decided to involve the junior high school industrial arts instructor and his shop facilities at our disposal. Opportunity now arose for orienting sixth-grade children into the general shop procedures used in the seventh grade. It also resulted in enrichment of our arithmetic, social studies, and language arts program.

The function of an industrial arts activity related to this unit of social studies was to give the students an opportunity to express themselves through activities which involve more than books and paper, to satisfy their needs for construction-type activity, and to give the sixth grade students first hand experiences in acquiring the knowledge and skill necessary for everyday community living.

Committees Organized

Committees were organized for each activity project: Greek house, boats, weapons, stable, house furnishings, and pool, all of which had been selected during the teacher-pupil planning session. Students selected the committee on which they wished to work and worked on preliminary sketches of their particular activity project. After these sketches were approved, final drawings were made by the different groups using a predetermined scale so all the parts would be in scale size with each other.

At this point the industrial arts teacher worked with each committee to help them to decide how to proceed with the construction. Items to be discussed included materials to be used, the type of construction, the tools needed, and how to proceed with the work.

Most of the larger construction work took place in the junior high school industrial arts classroom. The smaller items — house furnishings and the pond, for example — were carried on in the sixth-grade activity room, a glass partitioned work room connected to the classroom.

The house, consisting of a two-story main living quarters, slave quarters, porch, dining room, and fences, was built of $\frac{1}{8}$-in. plywood to which a $\frac{3}{8}$-in. square frame was nailed for support. The students used a jig saw to cut up strips of $\frac{1}{8}$ by 1 by $1\frac{1}{2}$-in. plywood for the shingles to be used on the roofs. When the house was mounted on the base the house furnishings committee took over and decorated the insides with furniture and tapestries.

The weapons committee, which consisted of two boys, constructed a battering ram and a device used for hurling large stones. These weapons were built of $\frac{3}{4}$-in. stock, dowel pins for axles and shafts, and $\frac{3}{8}$-in. pine for wheels. The roof of the battering ram was shingled the same way as the house.

The four boys making up the boat committee each constructed ancient Greek boats. The hulls were made of balsam wood which were shaped by knife, file, and a small belt sander. A dowel rod for the mast, a white cloth for the sail and the boat was complete.

The committees working on the stable and house furnishings used basswood for their construction. The tapestries were made of cloth and painted. The pond (set in the middle of the court yard) was constructed of aluminum and painted blue. The seams were filled so that the pond would hold water.

During all of this construction activity the student had a chance to put fractions to use through making scaled drawings, laying out, and measuring. Throughout his activity work the student also received instruction in the use and care of simple hand and power tools.

To culminate this combined math-social studies unit and to relate their experiences to a large scale operation, a field trip to the DeKalb Commercial Body Corporation, was planned. Here the students saw the importance of fractions and scaled drawings in mass production.

The children had the opportunity to see for themselves how scaled drawings were made, the importance of arithmetic, spelling, and the ability to be able to communicate effectively with each other in the operation of a plant.

Sixth graders are introduced to drafting procedures as an extension of their study of "scale."

▶ an in-service course or teacher checklist for —

Controlling Loss in the 1-A Shop

EARL D. HEATH

Industrial arts and vocational instructors assume the responsibility not only to accomplish the stated objectives of their curricula, but to do so with a minimum of waste in material and damage to equipment, and above all, with a minimum of physical risk to students. At the same time, the laboratory situation offers the instructor an excellent opportunity to bring to industrial arts and vocational students an understanding and appreciation of industry's necessary concern for loss control.

Accidents do not occur by chance nor are they the inevitable price to be paid for technological advance, as has been proven by the highly successful reduction of loss in industry where intensive loss control programs are in effect. Accidents and near-accidents result, in the laboratory situation, from the failure of responsible individuals to provide a relatively hazard-free work environment, from the failure of students to adjust to their environment, or from a combination of these two conditions.

The over-all accident experience in school laboratory situations is not good. There are indications that few teachers have received adequate instruction in establishing and maintaining an efficient laboratory environment and that few of them are sufficiently articulate in basic accident prevention doctrine.

This course outline in loss control is patterned after the techniques used by industry and is modified to suit it to application in the industrial arts and vocational laboratory. Teacher preparation institutions are in a peculiarly advantageous position to offer such a course. However, the content also lends itself well to the in-service type of instructional program, or can serve as a useful guide and check list for individual teachers or for supervisors.

Dr. Heath, formerly assistant professor of education at New York University, now lives in Springfield, Virginia.

an outline for loss control

I. Introduction
- 1.1. Educational objectives of industrial arts and vocational education
- 1.2. Efficiency aspect of loss control
- 1.3. Integration of 1.1. and 1.2. a natural and necessary concommitant
- 1.4. Industrial progress in the control of loss
- 1.5. Development of sound principles of loss control for the laboratory setting

II. Planning and Implementation of Accident Prevention Controls Related to Physical Conditions and Environment

2.1. Spatial Considerations: (*a*) entrances, exits, and passageways; (*b*) work area locations and arrangements; (*c*) storage and supply areas; (*d*) adequate clearances; (*e*) work in process and assembly areas; (*f*) isolation and segregation of hazardous areas; (*g*) personal facilities (*h*) flow charts (traffic and work)

2.2. Hygienic Considerations: (*a*) lighting — general, point of operation; (*b*) ventilation — adequate supply in amount, temperature, and purity; adequate exhaust ventilation controls — general, for specific operations; (*c*) color dynamic standards: room surfaces; machines; work areas; hot, cold, acid, and caustic substances, and identification of other hazardous materials; (*d*) personal facilities: drinking water supply and location of supply; lavatory and toilet facilities; first aid facilities; clothing lockers; (*e*) noise control; (*f*) radiant energy control;

2.3. Floor, Ramps and Walkway Considerations: (*a*) surfaces; (*b*) guard rails and toe boards; (*c*) hand rails; (*d*) tripping hazards; (*e*) loadings; (*f*) means of attaining elevation

2.4. Hand Tool Considerations (*a*) storage and location; (*b*) condition; (*c*) distribution

2.5. Machine and Power-Driven Tool Considerations: (*a*) installation, mechanical and electrical; (*b*) guarding (general and point of operation); (*c*) switch locations and controls; (*d*) capacities

2.6. Emergency Considerations: (*a*) warning devices; (*b*) automatic control devices; (*c*) standing operating procedural regulations; (*d*) first aid and referral procedures in the event of injury

III. Planning and Implementation of Accident Prevention Controls to Operations and Activities in the Shop Environment

3.1. Standing Procedural Regulations: (*a*) general; (*b*) specific; (*c*) sequence of operation controls

3.2. Maintenance Regulations: (*a*) hand tools; (*b*) machines and power-driven tools

3.3. Housekeeping Regulations: (*a*) aisles and walkways; (*b*) material and equipment storage; (*c*) refuse disposal (*d*) control of hazardous materials; (*e*) work in process and finished work storage

3.4. Personal Protective Equipment Regulations: (*a*) who, what, when, where, how; (*b*) maintenance, storage, issue, and control

3.5. Job Safety Instruction Integrated with Job Instruction: (*a*) standing operating procedures development for each operation; (*b*) explanatory stage; (*c*) demonstration by instructor; (*d*) supervised performance by learner; (*e*) individual performance by learner; (*f*) critique and correction

3.6. Record Maintenance to Assure Specific Qualifications: (*a*) by unit activity (date and signatures, teacher and pupil); (*b*) by machine or tool and operation (date and signatures, teacher and pupil)

3.7. Pre-Operational Inspections: (*a*) job specifications; (*b*) materials and tool equipment; (*c*) conditional inspection of pupil

3.8. Pupil Organization to Promote Accident-Free Operations: (*a*) safety assistants; (*b*) production and quality control assistants; (*c*) supply assistants

IV. Promoting a Philosophy of Accident Prevention as One Element of an Ethical Philosophy of Life

4.1. Use of Accident Prevention Techniques of Classroom to Generalize Broadly in Other Areas

4.2. Accident Prevention Sequence: (*a*) remove hazard if possible; (*b*) protect against hazard if impractical; (*c*) learn correct manner of performance in conjunction with preceding

4.3. Accident-Free Performance Tends to Increase Efficiency and Permit Further Adventures

V. Discussion of Special Problems

5.1. Discussion of Recorded Case Studies on Specific Problems

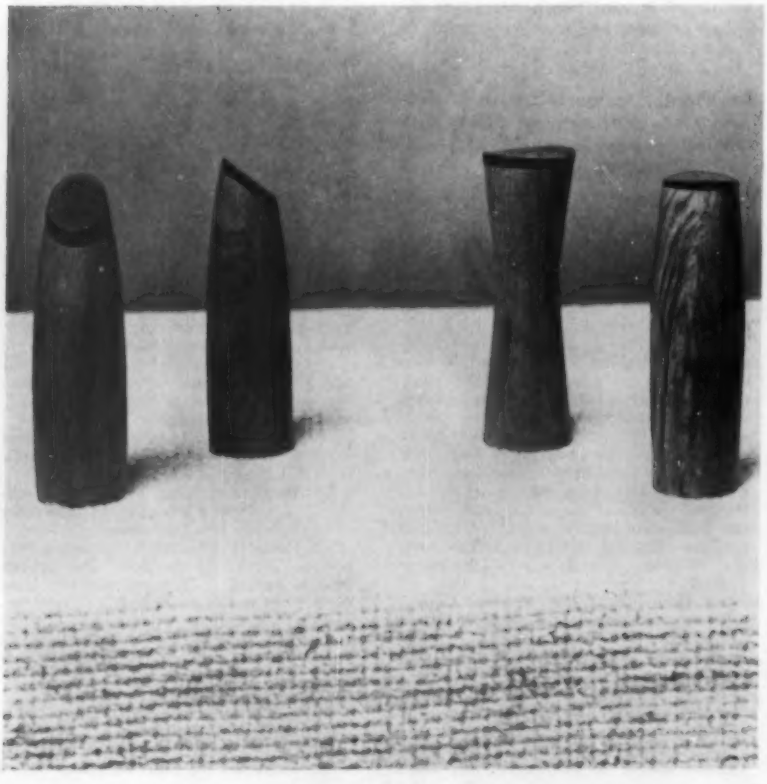
5.2. Analysis and Discussion of Problems Presented by Class Members ◀

▶ the fourth in a series of articles on how to apply the principles of good design to a variety of i-a areas —

DESIGN for the TEACHER

john r. lindbeck
Assistant Professor of Industrial Education, Western Michigan University, Kalamazoo, Mich.

Wood-Turning Project Design

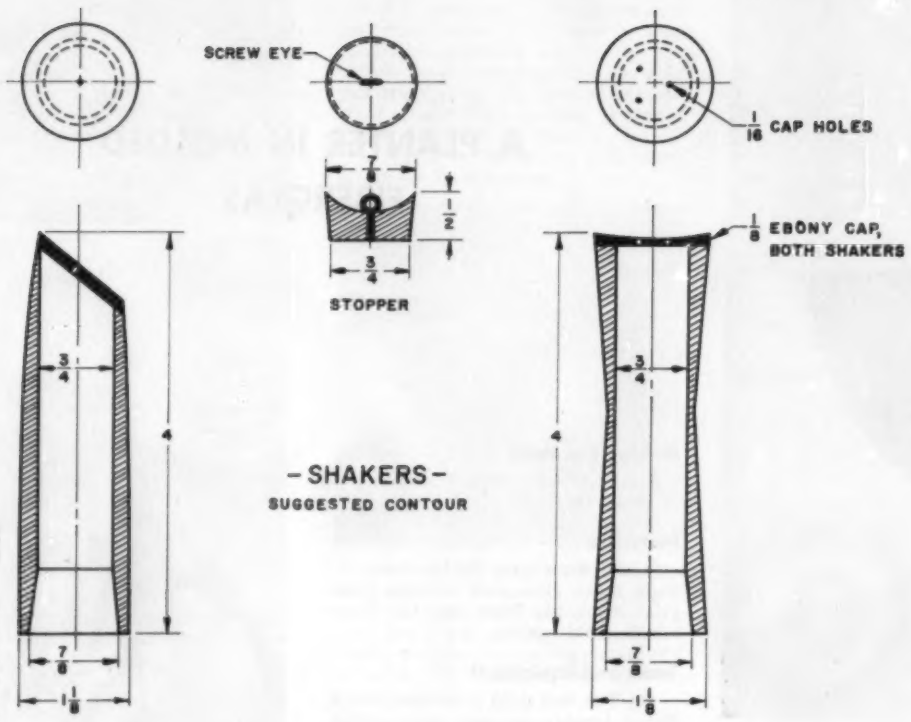


The wood lathe lends itself to creative work better perhaps than any other single woodworking machine. Here the operator has the rare opportunity to see his creation in the rapidly changing stages of fulfillment. Though he begins from a preconceived plan or idea of some object, he can altar and refine it as the turning progresses. Changes in the plan can be made quickly and with ease. And furthermore, he can often sand, finish, and polish the piece without removing it from the lathe. This versatile machine is one worthy of exploration and mastery.

Salt and Pepper Shakers

One experiences the versatility of this machine in the turning of salt and pepper shakers. As in any design activity, a first step must be one of analyzing or seeking answers to questions about the product. How tall should it be? What should be the size of the cavity? For what are they to be used? And what materials could be used are some of the points in the analysis?

Next, sketch a few shakers and select one with an appealing contour. For the shakers in the photograph and drawing, teak was selected as the



material, 4 by 1⅛ in. as the size and ¾ of an in. as the diameter of the hole to contain the seasoning. The size selections are to a degree arbitrary, but it must be kept in mind that a tall, very slender shaker tips easily and is a nuisance on the dinner table.

From here on it is a typical wood-turning process. A piece of teak 4½ in. by 1¼ in. is cut and the centers marked. The extra ½ in. in length is for the cutoff allowance. The piece is placed in the lathe and the turning commences. Plan the work so that the bottom of the shaker is at the tailstock end of the lathe.

Simplicity in Design

Simplicity is one of the design guideposts; in wood turning this maxim is easy to violate and care, therefore, must be taken to guard against such violation. A multitude of scrolls, beads, and grooves which decorate so many wood-turning projects do not lend themselves to this idea of simplicity in form. They should be used sparingly and with discretion. If the designer will bear this in mind, thinking primarily in terms of graceful, clean-flowing lines, he can achieve this simplicity of form. If the sketched shape appears awkward in reality, a few touches of the chisel can cause the shape to be changed to a more pleasing one. In a like manner, very slight alterations can be made with a file.

When the turning is completed, the shaker is ready for sanding. The grit of paper to be used is dependent entirely upon the type of wood which is used.

Next, remove the live center from the headstock and insert a chuck and a ¾-in. machine spur bit. Turn the work end-for-end in the lathe. Cut the lathe speed down to drilling speed, make certain that the drill is exactly centered in the work, and commence drilling, very slowly. When the drill has entered the work for 4 in., withdraw the drill, insert a ⅞-in. tapered ream, and a ream as illustrated in the drawing. Remove the work from the lathe and cut off the ½-in. allowance on the band saw, using a V block to hold the work.

Finishing the Shakers

The top of the shaker can now be sanded squarely, or at an angle as shown in the drawing. Use a V block to hold the work while disk sanding. A cap of ebony or some other contrasting wood is contact-cemented in place and sanded to shape. Three cap holes, carefully located, are drilled in the salt shaker, and one in the pepper shaker. The shaker is then finish-sanded, waxed, and buffed. Corn oil, wipe-on finishes, or lacquer are among the many other finishes which may be used.

The hardwood stopper is turned on the lathe, as per the drawing, and a pilot hole drilled to receive the screw eye. A cork stopper may be used, but it is less desirable because of the difficulty in extracting it. By grasping the screw eye with pliers or a hooked instrument, the wooden stopper may be removed from the shaker with ease.

Illustrated here are just a few ideas for turned shakers; there are innumerable other possibilities of shape and form. They await the experimentation, creativity, and ingenuity of the designer. ◀

A PLANTER IN MOLDED FIBERGLAS

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New materials are widening the scope of industrial arts offerings. One of these which has proved interesting is polyester resin with glass cloth and mat.

The accompanying illustrations and procedures will form a beginning for work in fiberglas projects.

The project is divided into three parts: (1) Making the mold. (2) Making the planter. (3) Making the stand.

Certain precautions should be observed: (1) Follow the resin manufacturers' or dealers' instructions of critical measurements. (2) Molds should be clean and prepared for molding according to instructions. (3) Resin *should not* be brushed on the mat but "patted" on. (4) Resin should be applied sparingly and rolled into the mat. The mat should be thoroughly saturated. (5) The finished molded planter should harden at least forty eight hours before removing from the mold. (6) It is advisable to mix one-half pint or less of resin until some degree of skill has been attained. (7) Brushes and rollers should be cleaned in commercial acetone.

Making the Mold

A commercially made planter is used to shape the mold.

Materials

(1) Polyester resin. (2) Hardener. (3) Eight ounce glass cloth cut into triangular strips. (4) Paste wax. (5) Water soluble mold release.

Tools and Equipment

(1) Two inch short pure bristle brush. Nylon brushes are not recommended. (2) Stand for holding planter. (3) ⅛ in. x ¾ in. waxed hardwood strips. The strips should be pointed on one end and the corners rounded.

Procedure

1. Brush on two coats of paste wax. Let dry and polish each coat.

2. Brush on a coat of water soluble mold release and let dry.

3. Flow on two coats of no-run polyester resin with a brush, allowing each coat to harden. These coats are called gel coats.

4. Brush on a third coat of resin and apply triangular pieces of cloth to the "tacky" resin. Continue this procedure until the mold has been built to two

layers of cloth. The cloth should be thoroughly saturated with resin as it is applied.

5. Trim the excess cloth with shears before complete hardening of the resin.

6. Allow to harden and remove from the planter. (*See* steps 13, 14, 15, in "Making the Planter.")

7. Sand the edges to a smooth line.

8. Clean the inside of the mold with 2/0 steel wool, household cleanser and water.

9. Sand the inside of the mold smooth and polish with buffing compound.

Fabricating the Planter
Materials

(1) Polyester resin. (2) Hardener. (3) ¾ oz. glass mat *torn* into triangular pieces. (4) Color for resin. (5) Paste wax. (6) Water soluble mold release.

Tools and Equipment

(1) Two inch short pure bristle brush. (2) Stand for holding mold. (3) Roller. (1½ in. diameter x 1½ in. long, paint type, coarse.) (4) Jig to keep mold from rolling. (5) ⅛ in. x ¾ in. waxed hardwood strips.

Procedure

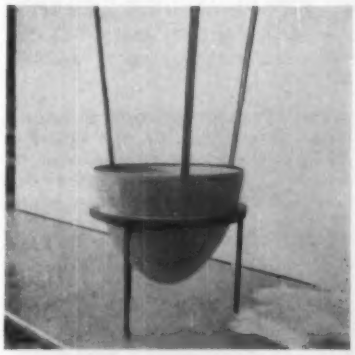
1. Clean the mold with soap or cleanser and water.

2. Brush on two coats of paste wax, allow each to harden, polish each coat.
3. Brush on a coat of water soluble mold release, allow to dry.

4. Brush on two gel coats of colored resin, allow each coat to harden. The first coat of resin should be brush-flowed and care should be taken so that the thin film of mold release is not broken.

5. Brush on a third coat of colored resin.
6. Apply mat to "tacky" resin.
7. Saturate mat with resin by patting on, *do not brush*.
8. Roll mat until saturated with resin.
9. This procedure should be continued until three layers of mat have been applied. This procedure need not be continuous but may be stopped at any point and resumed at any time. Some students require three working periods of fifty minutes for this step.
10. Trim the excess mat with shears before the resin hardens.

11. Allow the resin to harden approximately 48 hours.
12. Sand the edges evenly.
13. Insert one or more of the waxed hardwood strips between the planter and the mold. (Try one strip at first, more if necessary.)



14. Pour water in the space beside the strip.
15. *Do not hurry* the process. The resin shrinks slightly and some planters have been removed from the mold simply by flexing lightly and inverting.
16. Clean the mold release and wax from the planter by scrubbing with steel wool and cleanser. Rinse with water.

The Stand

Materials

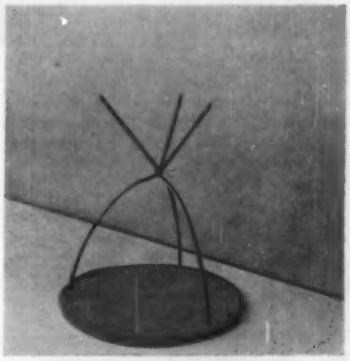
(1) Three pieces of ⅜ in. steel rod. (2) Three rubber crutch tips to fit the rod. (3) Metal primer and paint.

Tools and Equipment

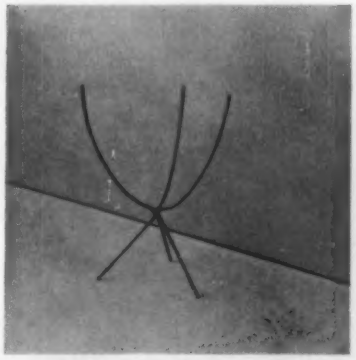
(1) Jig showing the shape of the rods. (Made by bending wire solder around the planter and transferring to a board or paper.) (2) Bending jig. (Held in woodworking vise.) (3) ⅜ in. x 30 in. wrought iron pipe. (The pipe is used to provide leverage in bending the rod.)

Procedure

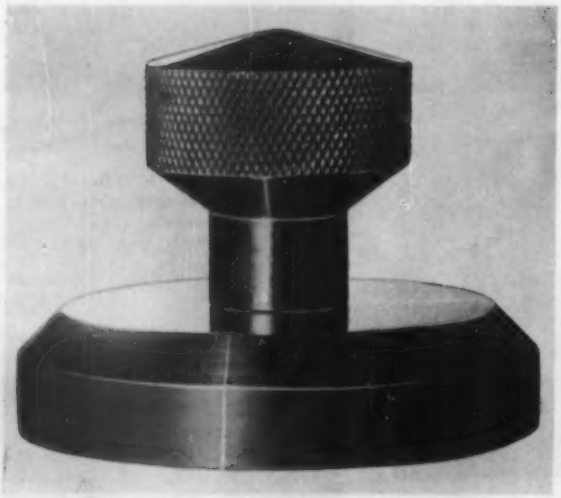
1. Bend the rods to the desired shape.
2. Drill holes in a scrap board for use as a jig to hold the rods while welding.



3. Wire the legs together.
4. Weld the top and bottom joints.
5. Clean the weld.
6. Remove the wire and apply metal primer and paint. (The stand in the illustration was primed with zinc chromate and finished with flat black.)



The planter can be made with clear resin, cleaned, sanded and: (1) Primed with zinc chromate primer and painted any desired color. (2) Painted with Epoxy resin. ◀



A FIRST-YEAR MACHINE TOOL PROJECT FOR HIGHLIGHTING MATHEMATICS

CARL GASSEN

Evanston, Ill., Township High School

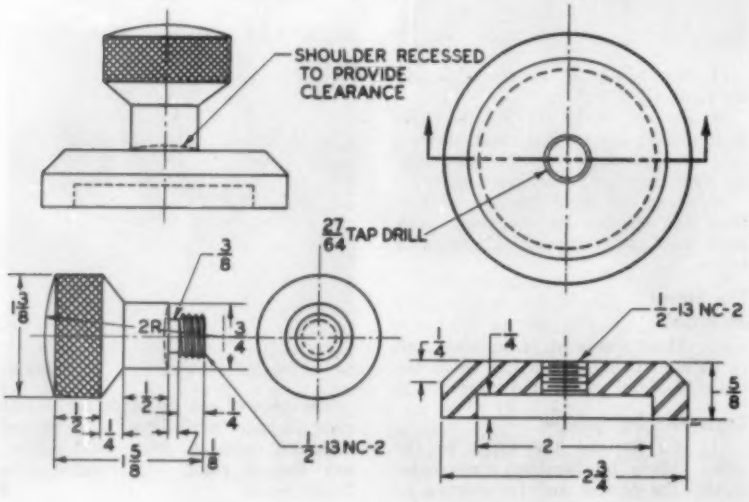
This project may be used to teach the usefulness of both geometry and trigonometry in solving problems with which machinists and tool and die makers are sometimes faced.

The geometric pythagorean theorem — "in a right triangle, the square of the hypotenuse equals the sum of the squares of the other two sides" — is used to determine the length of the chamfer on the paper weight top. Then, from trigonometry, the sine formula is computed as shown in the "Procedure to Make Top," after which the angle in degrees is found by referring to a sine table.

A variety of lathe operations are involved in making this paper weight. Included are: cylindrical turning, shouldering, knurling, drilling, boring, facing, threading, parting, and freehand forming.

Materials required are relatively inexpensive.

A rust- or corrosion-resistant finish may be obtained by either dipping or spraying a thin coat of lacquer on the surface.



Procedure to Make Base

1. Select material — 3 in. D. Cold Rolled Steel, SAE 1020.
2. Cut material to ¾ in. length in power hack saw.
3. Place material in 4-jaw chuck and true up, letting one end project about ¼ in.
4. Face end of material true.
5. Drill ¼-in. hole through material.
6. Drill 27/64-in. tap drill hole through pilot drill hole.
7. Bore material to ¼ in. depth and

2 in. diameter using facing tool.

8. Cut ½-13 N.C. thread through base, resting center hole in tap shank on tailstock center.

9. Remove material from chuck.

10. Place material on threaded mandrel, bored surface against mandrel shoulder.

11. Turn material to 2¾ in. diameter.

12. Face material to ⅝ in. thickness.

13. Cut 45° chamfer as indicated on plan.

14. Polish material using emery cloth and lubricating oil.

NOTE: Set lathe spindle at high speed for polishing.

15. Remove finished base from mandrel.

Procedure to Make Top

1. Select material — 1½ in. D. brass or Cold Rolled Steel, SAE 1020.

2. Cut material to 4 in. length in power hack saw.

3. Place material in a 3- or 4-jaw chuck, with about 3 in. projecting.

4. Face and center drill projecting end, then support with tailstock center.

5. Turn material to 1⅜ in. diameter for about 3 in.

6. Turn ¾ in. diameter for ⅞ in. from projecting end.

7. Cut chamfer from ¾ in. diameter to 1⅜ in. diameter.

NOTE: A practical application of geometry and trigonometry may be used to determine the chamfer angle as follows:

a. From geometry, use the following formula:
$c^2 = a^2 + b^2$, where c^2 = the hypotenus squared; $a^2 = (\frac{5}{16})^2$ — the length of the side found by difference in diameters divided by 2; and $b^2 = (\frac{1}{4})^2$. The length of side c is found by extracting the square root of c^2

b. From trigonometry, the sine formula is used:

$$\text{Sine A} = \frac{\text{Side Opposite}}{\text{Hypotenuse}};$$

this means, $\text{Sine A} = \frac{a}{c}$

c. Finally, by consulting a sine table the exact chamfer angle is determined in degrees and the compound rest offset is made and the chamfer is cut.

8. Knurl the 1⅜ in. diameter.

9. Turn the ½ in. thread diameter and recess the shoulder as indicated on the plan.

10. Set the lathe for cutting ½ in. — 13 threads.

11. Cut the threads, fitting the base to the threads.

12. Polish the chamfer and the ¾ in. diameter.

13. Cut off the material, using a parting tool. Allow ¼ in. for the radius.

14. Place the ¾ in. diameter in a 3-jaw chuck.

15. Cut the rounded top using a 2 in. radius gauge.

16. Polish the rounded end.

17. Assemble the paper weight. ◀

A VISUAL AID FOR AUTOMOTIVE MECHANICS

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There has been a need for a better and simpler method of teaching automotive electricity. This teaching aid provides a better, simpler method of teaching automotive electricity.

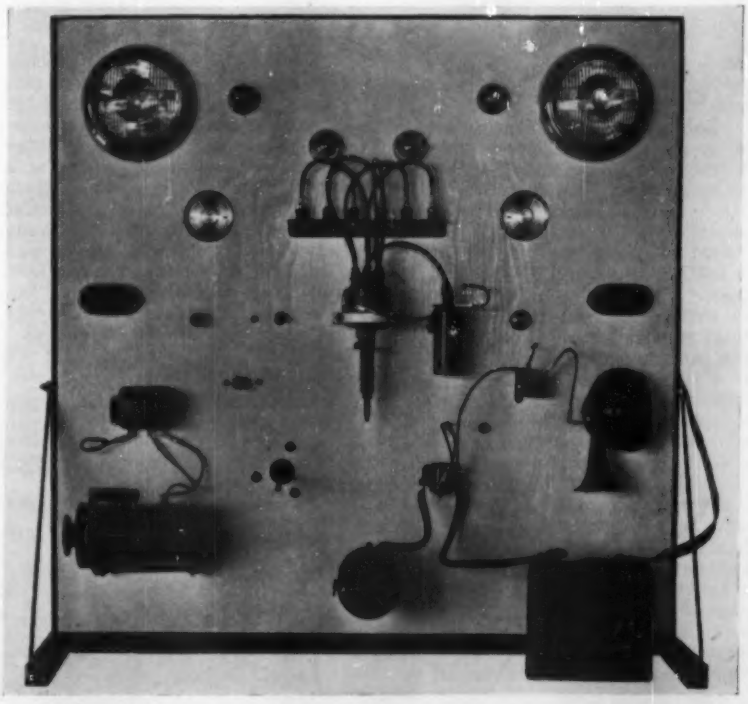
The base is of ¾-in. plywood, 4 ft. square. The back is covered with sheet metal to serve as a common ground much the same as the frame of the automobile serves as a common ground for automotive electrical equipment. Holes cut through the board receive the electrical units which are mounted so that most of the wiring can be done on the back. The following electrical devices can be mounted on the board: battery, cranking motor and solenoid, generator and regulator, complete ignition system, head, parking, tail, license and stop lights, horn relay and horn, and, in addition, all electrical indicating equipment.

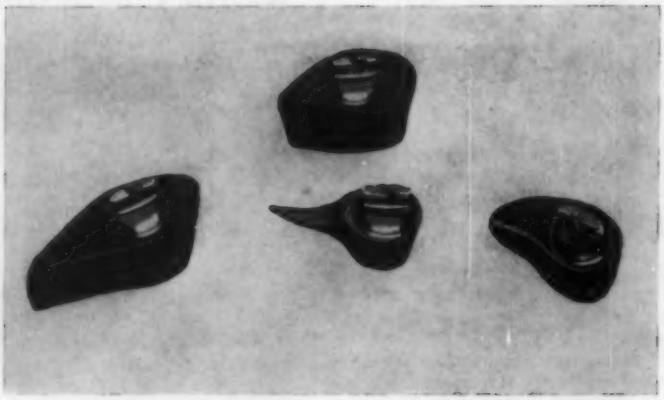
The board was encircled with channel iron and braced so it will stand on a table. All connections are wired with alligator clips to facilitate disconnecting and connecting the various electrical units.

This visual aid has been invaluable in explaining the operation of various units of the automobiles' electrical system. It is used to demonstrate electrical wiring, operation of the various electrical units, and the application of many physical laws of electricity as they apply to the automobile.

After instruction has been given on the electrical system, the students in my classes are required to make a schematic drawing of the board. After the drawing is checked the students use it to wire the board. This gives them experience in actually hooking up all of the electrical units of the automobile. It is also a good test to see what has been learned.

Construction cost is actually very small. Local wrecking yards will donate most of the electrical units that are needed. ◀





FREE FORM TABLE LIGHTER

A. C. VASIS, JR.
Chicago Teachers College
Sabin Campus, Chicago, Ill.

Bill of Materials

Quan.	*Material*	*Size*
1	Table lighter assembly	
1 pc.	Any kind of wood	1¾ x 2 x 2 in.
1 pc.	Black felt	1½ in. dia.
1	Flat head steel wood screws	¾ in. No. 6

Many shop teachers have the problem of accumulating scrap stock and then throwing most of it away. Much of the waste stock can be fastened together and used in making fine projects. Other pieces of waste stock can be used as is for certain projects. When students turn wooden bowls they cut out a circular piece of wood from a plank. The waste stock from this operation can be used to make various projects. The free form table lighter can be made from this waste stock or smaller pieces may be glued up to the desired thickness.

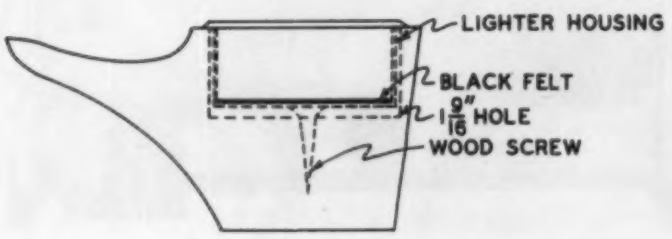
Tools and Supplies

Six in. steel rule, standard screw driver, scriber, ratchet bit brace, expansion bit, files, file card.

Jig saw or band saw, sander.

Paper and pencil, sandpaper — 2/0, 4/0, 6/0.

Lindseed oil, cloth, rubber cement.

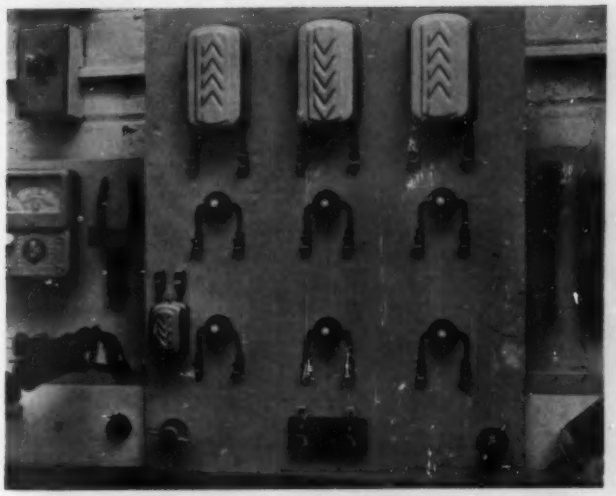


Plan of Procedure

1. Make a sketch of the design desired and select stock.
2. Lay out design on stock.
3. Drill 1 9/16 in. dia. meter hole ¾ in. deep for lighter assembly.
4. Saw to the line with jig saw or band saw.
5. File to the line.
6. Sand all surfaces.
7. Resand all surfaces.
8. Apply linseed oil.
9. Fasten lighter housing with ¾ in. No. 6 flat head wood screw.
10. Cement 1½ in. dia. black felt over screw.

The free form lighter allows the student to exercise creativity. When finished he has an attractive and useful gift item. Imported lighters can be purchased for one dollar. The student may have one at home with a broken or damaged base that can be used.

APARTMENT CALL SYSTEM



M. D. ROBERTS and W. O. SATTERLEY
Associate Professor of Industrial Technology and Assistant Professor of Engineering Graphics
Purdue University, Lafayette, Ind.

For those who are teaching or are planning to teach electricity in their shop program here is a practical exercise in the form of a circuit board which can be quickly removed to be replaced by another of equal value. There are dozens of useful electrical circuits, the parts for which can be mounted on such a panel. The student is given hookup wire and tools, plus the diagram if necessary, and directed to connect the circuit so it will operate satisfactorily.

This panel has three bells, one buzzer, and six push button switches. This equipment is representative of that installed in apartment homes. It would be sufficient to take care of three different apartments having a common entrance. Each apartment would have one bell and one switch. The common entrance would have the buzzer and the three remaining switches. Upon arrival the visitor would push the switch for the desired party. Upon hearing their bell this party would then push the switch in their apartment which would operate the buzzer at the entrance indicating they are at home. The problem is to hook up this circuit with a minimum number of pieces of hookup wire. At least four standard No. 6 dry cells should be connected into a series battery of six volts for this exercise.

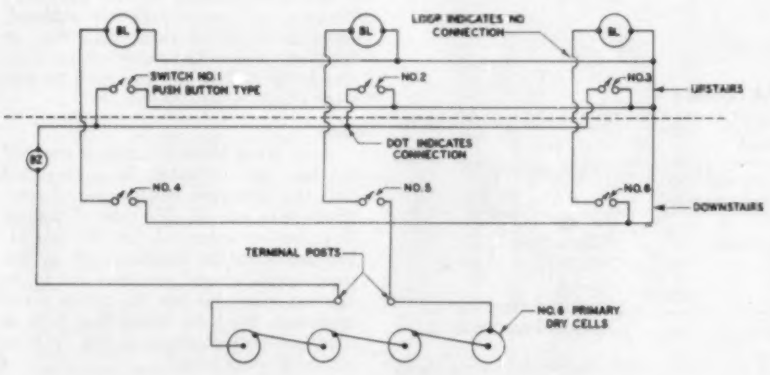
Facts the Student Should Learn

1. The major difference between bells and buzzers.
2. The application of a return call system in apartments.
3. The effect of varying the voltage and amperage in a circuit.

Procedure

1. Procure the panel and mount it at your station.
2. Remove the covers from the bells and the buzzer. Note the difference in construction.
3. Obtain four No. 6 dry cells with jumper wires.
4. Connect two dry cells in series with one lower switch and one bell. Operate it.
5. Add one upper switch and the buzzer into the circuit so it will operate.
6. Add a second bell and a second lower switch and operate.
7. Add a second upper switch so the same buzzer will operate from it.
8. Add the third lower switch and the third bell, operate.
9. Add the third upper switch to the original buzzer circuit, and operate.
10. You now have an apartment call system for three apartments. A visitor may call for any one or all three upstairs apartments from a lower entrance and the persons above may signal back that they are home, "Come on up!"
11. The number of volts will affect the signal strength. Add the third and fourth dry cells in series into the circuit and note the increase of signal.
12. Disconnect the dry cells and reconnect them parallel fashion back into the circuit. Operate and note the difference in signal strength.

The job is done right when (1) Each lower button will ring the bell directly above it. (2) Each upper button will ring the buzzer below.



Test Questions

1. Explain in a few sentences what mechanical and electrical applications cause the buzzer or bell to vibrate back and forth.
2. Make a schematic drawing of the four dry cells into a series battery showing the amperage and voltage at the terminals of the battery.
3. Make a schematic drawing of the four dry cells into a parallel battery showing the amperage and voltage at the terminals of the battery.
4. Explain why the series battery operates the system better than the parallel battery, yet the same number of cells is used in each.
5. Draw a schematic circuit diagram of the apartment call system with the four dry cells connected in the most efficient manner.

Challenge:

A new No. 6 Dry cell is rated at about 35 amperes and 1½ volts. Can you hook these four up so they will produce a voltage of 3 volts at a current rating of 70 amperes? If so, draw the diagram.

Remember: (1) Remove all wires from panel before storing. (2) Remove all jumper wires from dry cells.

THERE'S TAKE-HOME PAY IN THIS SERIES TESTER

ROBERT J. MOUSER
Instructor, Electricity and Electronics
South Union High School, Uniontown, Pa.

YOUR SERIES TESTER
THIS BOOKLET OF OPERATING INSTRUCTIONS IS DESIGNED TO BE USED WITH THE SERIES TESTER YOU HAVE CONSTRUCTED IN THIS ELECTRIC SHOP COURSE.
USE IT AS A GUIDE TO YOUR TESTING. WITH REASONABLE CARE, YOUR TESTER SHOULD GIVE MANY YEARS OF DEPENDABLE SERVICE.

The cover (above) and pages (at the right) of a simply duplicated booklet explaining to parents the use of the series tester.

In a recent IA/VE editorial (see page 253 of your IA/VE for November, 1959), the editor stated, "If we are so convinced of the values of our program, why do we make such a poor impression on parents? As we see it, there are many reasons for this. It seems to us that major reason — especially on the junior high school level — can be found in the *things Johnny takes home*. Unfortunately, the pay-off is, and always has been, the *project*."

Perhaps the most important feature of this project (aside from its teaching value) is that the student can take it home to demonstrate the theory of electrical continuity testing. The author has designed a *simple booklet* that can be easily duplicated by mimeograph or other processes. This is issued to the student when he takes his tester home. This simple project and booklet has taught many fathers the use of the series tester. The project has been a huge success. It has:

1. Been cheap to construct.
2. Had excellent utility value and teaching experience.
3. Been dependable and cannot be purchased on the commercial market in a superior form for a lesser cost.
4. Fostered student interest to further their electrical experiences by appliance and other home electrical repairs.
5. Impressed the parents by their sons' use of it and the general understanding he has of series testing technique.

BILL OF MATERIALS

Quan.	*Part*	*Material*	*Size*
2	Sides	B. Willow or any softwood	½" x 2" x 5"
2	Ends	B. Willow or any softwood	½" x 2" x 2"
2	Top and bottom	Masonite	⅛" x 3" x 5"
1	Test light socket	Concealed clete type	Edison base
3'	Lampcord	Rubber	No. 16/2
6'	Testlead	Fixture wire	No. 16
4	Test prods		Standard earphone tip
2	Jacks		Standard earphone tip
1	Attachment cap		

Construction

The sides of the case are constructed of soft wood and the top and bottom of masonite. Since the case is only 3 by 5 in. in size, it is extremely economical to construct. All joints are butt type assembled with glue and wire brads. The top (made of masonite) is the only part of the box that requires special work (see top layout drawing). It should be fastened to the case with wood screws. (See procedure listing.) Author had students finish their cases with a flat black paint for a good professional appearance.

Wiring

Wiring is shown in the schematic drawing. All connections are soldered. Internal wiring is done with No. 18 hook-up wire. An underwriters knot should be tied in the line cord to prevent strain on the splices.

Use

Basic series tester techniques are used for this type of tester. It is suggested that the instructor build a unit of electrical work around this type of testing. It is further suggested that the instructor duplicate the booklet (see sample pages opposite) and pass them out to the student when he has his series tester approved. We have found that it is an excellent public relations tool in your electrical shop work! ◀

THE SERIES TESTER

THE SERIES TESTER IS AS VALUABLE TO THE ELECTRICAL STUDENT AND REPAIRMAN AS THE STETHOSCOPE IS TO THE DOCTOR. BOTH THE STETHOSCOPE AND THE SERIES TESTER ARE PIECES OF EQUIPMENT USED TO STUDY SYMPTOMS AND MAKE DIAGNOSIS ABOUT SOMETHING.

YOUR SERIES TESTER CAN TELL YOU MANY THINGS ABOUT AN ELECTRICAL CIRCUIT. IT CAN TRACE TROUBLE DOWN TO THE VERY AREA IN WHICH IT OCCURS.

THE SERIES TESTER CAN BE USED ON MANY DIFFERENT PIECES OF ELECTRICAL EQUIPMENT. SOME OF THE EQUIPMENT THAT CAN BE CHECKED WITH IT ARE:

FUSES	COILS
LIGHT BULBS	ELECTRIC APPLIANCES -- ELECTRIC IRONS, HEATERS, WAFFLE IRONS, SWEEPERS, TOASTERS, ETC.
SWITCHES	
WIRING CIRCUITS	CHECK TV ANTENNA LEAD IN WIRE
EXTENSION CORDS	CHECK ELECTRICAL GROUNDS
APPLIANCE CORDS	DISCOVER SHORT CIRCUITS

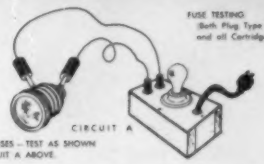
THE ABOVE IS NOT A COMPLETE LISTING OF THINGS THAT CAN BE CHECKED WITH THIS TESTER. THIS IS MERELY A SUGGESTION OF THE THINGS THAT YOUR TESTER CAN DO.

SINCE YOU HAVE CONSTRUCTED THIS TESTER, YOU KNOW THE CIRCUIT. THIS WILL HELP YOU TO ENJOY ITS USE AND YOU KNOW THAT IT IS WELL BUILT AND WILL OFFER MANY YEARS OF TROUBLE FREE SERVICE.

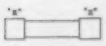
IT IS RECOMMENDED THAT A TEN (10) WATT BULB BE USED IN IT, ALTHOUGH ANY SIZE BULB WILL DO.

THE FOLLOWING PAGES ARE SOME INSTRUCTIONS ON THE USE OF THE TESTER. MAKE YOURSELF VERY FAMILIAR WITH THESE HOOK-UPS. YOU WILL SOON LEARN TO USE THIS TESTER FOR MANY OTHER PURPOSES.

THIS TESTER CAN BE USED ON EITHER ALTERNATING OR DIRECT CURRENT BUT THE VOLTAGE MUST BE 110 VOLTS. (220 VOLTS CAN BE USED IF A 220 VOLT BULB IS USED IN PLACE OF THE 110 VOLT ONE.)



PLUG FUSES -- TEST AS SHOWN IN CIRCUIT A ABOVE.

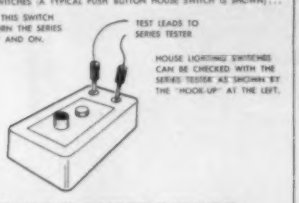


CARTRIDGE FUSES -- CHECK BY TOUCHING TEST LEADS FROM SERIES TESTER TO POINTS "X" AS INDICATED AT LEFT

NOTE: TO CHECK HOUSE LIGHT BULBS, USE THE SAME "HOOK-UP" AS SHOWN IN CIRCUIT A ABOVE. IF THE LIGHT BULB BEING EXAMINED IS GOOD, THE SERIES TESTER BULB WILL LIGHT.

TESTING SWITCHES (A TYPICAL PUSH BUTTON HOUSE SWITCH IS SHOWN)...

SNAPPING THIS SWITCH SHOULD TURN THE SERIES TESTER OFF AND ON.


TEST LEADS TO SERIES TESTER
HOUSE LIGHTING SWITCHES CAN BE CHECKED WITH THE SERIES TESTER AS SHOWN BY THE "HOOK-UP" AT THE LEFT.

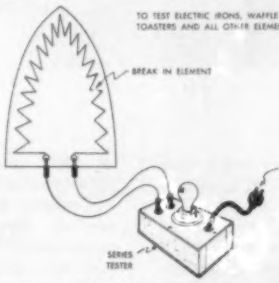
NOTE: FOR THIS TYPE OF TESTING, SOME STUDENTS WILL WANT TO SUBSTITUTE ALLIGATOR CLIPS FOR THE TEST PRODS AS SHOWN. THIS MAKES IT MORE CONVENIENT TO CONNECT THE TEST LEADS SINCE THEY CAN BE CLIPPED ONTO THE SWITCH SCREWS INSTEAD OF IT BEING NECESSARY TO HOLD THEM IN PLACE.

TESTING EXTENSION AND APPLIANCE CORDS

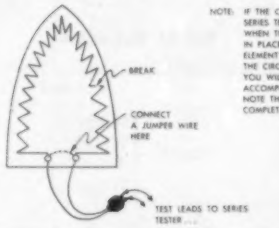
IN THE CIRCUIT ABOVE, THE SERIES TESTER WILL NOT LIGHT BECAUSE THE CORD HAS A BREAK IN IT AT "X". NOTE THAT A JUMPER WIRE MUST BE INSTALLED AT THE FEMALE PLUG OF THE EXTENSION CORD. TO FIND THE CONCEALED BREAK, IT IS MERELY NECESSARY TO GO ALONG THE CORD, INCH BY INCH, AND WIGGLE IT WITH THE FINGERS. WHEN YOUR FINGERS ARE OVER THE CONCEALED BREAK, THE WIGGLING WILL CAUSE THE WIRES TO TOUCH TEMPORARILY AND YOUR SERIES TESTER WILL LIGHT. YOU WILL THEN KNOW WHERE THE BREAK IS LOCATED.

ALL TYPES OF ELECTRICAL CORDS MAY BE CHECKED IN THIS FASHION. THIS INCLUDES ALL APPLIANCE CORDS.

TO TEST ELECTRIC IRONS, WAFFLE IRONS, ELECTRIC HEATERS, TOASTERS AND ALL OTHER ELEMENT TYPE APPLIANCES...



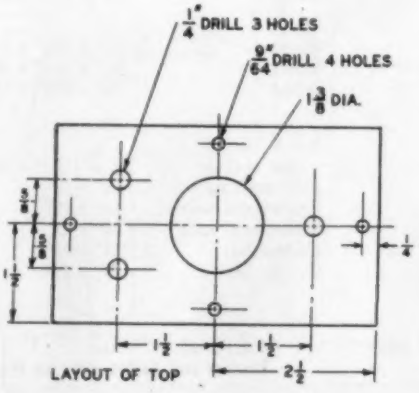
TO TEST ELECTRICAL APPLIANCES THAT USE AN ELEMENT TO HEAT, THE FOLLOWING PROCEDURE IS USED. NOTE THAT THE SERIES TESTER IS CONNECTED TO THE ENDS OF THE HEATING ELEMENT. IF THE ELEMENT HAS A BREAK IN IT (AS SHOWN ABOVE) THE SERIES TESTER WILL NOT LIGHT AND YOU WILL KNOW THAT THE ELEMENT IS DEFECTIVE AND NEEDS TO BE REPLACED. TO CHECK THE CORD ON THIS ELECTRIC IRON, USE THE FOLLOWING "HOOK-UP"...

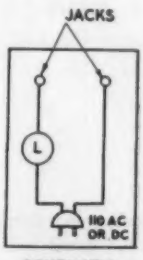


NOTE: IF THE CORD IS GOOD, THE SERIES TESTER WILL LIGHT WHEN THE JUMPER WIRE IS IN PLACE EVEN THOUGH THE ELEMENT IS BROKEN. CHECK THE CIRCUIT THROUGH AND YOU WILL SEE HOW THIS IS ACCOMPLISHED. YOU WILL NOTE THAT WE HAVE A COMPLETE CIRCUIT

Procedure

1. Construct box frame using glue and wire brads.
2. Attach bottom with glue and brads.
3. Lay out top according to diagram.
4. Drill holes as indicated.
5. Hole for test light socket may be cut out on the jig saw.
6. Give entire box a coat of flat black paint.
7. Attach test light socket and jacks.
8. Complete the wiring to all terminals (check example or wiring diagram).
9. Connect the leads to the test prods.
10. Connect the attachment cap to the lampcord.
11. Attach top to base with ½ in. No. 6 wood screws.





AN UPHOLSTERED CHAIR

JAMES ZEASMAN
Instructor, General Woodworking
Mt. Horeb, Wis.

One of the new and very much neglected areas of industrial arts is upholstery.

This simple, modern, upholstered chair is relatively inexpensive. Of tight spring construction using zigzag springs, rubberized hair, and cotton felt. It is an ideal project for the small high school industrial arts shop.

The only additional tools needed that are not already in every shop are a magnetized tack hammer, a webbing stretcher, and some curved needles. The total cost for these tools is about $4.00.

Bill of Materials

No. of Pcs.	*Part*		*Material*	*Size*
2	Rear legs	Finish	Wood	1½" x 6" x 30"
2	Front legs	Finish	Wood	1½" x 2¼" x 16"
2	Arm tops	Finish	Wood	1½" x 2" x 17½"
2	Arm fronts	Finish	Wood	1½" x 2" x 13"
Back Frame				
2	Top and bottom		Wood	¾" x 5" x 18"
2	Back slats		Wood	¾" x 3" x 12"
2	Sides		Wood	¾" x 2¼" x 10½"
Seat Frame				
2	Side rails		Wood	¾" x 3½" x 21"
1	Front		Wood	¾" x 3½" x 18½"
1	Back		Wood	¾" x 3½" x 16½"
Upholstery Materials				
5			No. 9 NoSag seat springs	19½"
5			Jute webbing	3½" x 12"
1			Rubberized hair	12" x 19"
1			Rubberized hair	20" x 21"
1			Cotton felt	17" x 23"
1			Cotton felt	27" x 28"
Miscellaneous Supplies				
¾" dowel rods				
Carriage bolts for legs and arms			1.1 yd. of 54" fabric	
"E" clips, screws, glue, etc.			Burlap and tacks, etc., as required	

The necessary materials can be stocked in convenient amounts and are not too expensive. Therefore, the investment is low.

The framework is best made of white ash with finish wood as desired by the typical woodworking methods. Use all butt joints reinforced with dowels.

The upholstery base is zigzag springs, tied with spring twine, and covered with burlap, canvas, or other heavy fabric. On top of this is fitted 1 in. thick rubberized hair covered with 1 in. thick cotton felt. This is covered with a light cotton fabric, material from an old shirt or skirt will do. This allows for adjusting the stuffing with ease and also gives valuable practice in upholstery. The cover fabric is now put in place with 4 oz. tacks. Corners may be sewn with a concealed stitch, or they may be tacked down with gimp nails.

The students and their parents are all very enthusiastic over this and similar projects, and they have helped to sell my program to the community and to the underclassmen.

Shaping Procedure

1. Square up front legs. With band saw taper inside and back of legs. Sand and finish.
2. Lay out pattern for rear legs on wood, squaring up back edge and bottom end first. Band-saw inside taper, sand and finish.
3. Square up arms. Cut angles (top of vertical and front of top). Cut pieces to length and taper both pieces. Drill for hidden dowel joint and glue up, sand and finish.
4. Square up pieces for seat frame. Cut angles on front and back pieces.

Glue up with glue blocks (thin ones on front where front legs help); use butt joints. Drill for ⅜ in. dowel and dowel all joints.

5. Cut back frame to length. Lay out and band-saw in a pair. Square up back supports and side rails. Notch for back supports. Glue up. Drill and dowel side joints. Reinforce back supports with screws.

Upholstery Procedure

1. Locate and install No-sag springs on seat (see step four). Tie springs with spring twine (can use small coil springs). Cover springs with burlap or canvas. Cut rubberized hair to size, tack in place with five or six tacks. Cover with 1 in. thick cotton felt, tack in place with tacks five or six inches apart. Tack light cotton sub cover in place. Check shape and fit. Adjust as needed (tack under edge of frame). Tack finish fabric in place (use extreme care on corners to make smooth). Sew corners with concealed stitch (use curved needle).

2. Tack webbing in place on the back (go both ways and criscross). Cut rubberized hair to size, tack in place with five or six tacks. Cover with 1 in. thick cotton felt, tack in place with few tacks five or six inches apart. Tack light cotton sub cover in place. Check shape and fit. Adjust as needed (tack under edge of frame). Tack finish fabric in place (use extreme care on corners to make smooth). Sew corners with concealed stitch (use curved needle). Cut corrugated cardboard the size of the back less ¼ in. each way. Curve to fit curve of back. Cut fabric 2 in. bigger each way, fold over board and tape edges to back of board. Lay in place and tack in place with gimp nails (small head) or sew by hand.

Assembly Procedure

1. Notch front legs to fit frame, glue and assemble with ¼ in. carriage bolts (one each way).

2. Notch rear leg to match seat frame with band saw (use care on this as it determines the comfort of the chair).

3. Notch tops of rear legs to match the curve of the back with bandsaw.

4. Upholster seat and back (see upholstery procedure).

5. Bore and countersink rear legs and bolt them to the seat (use care to get legs vertical and parallel).

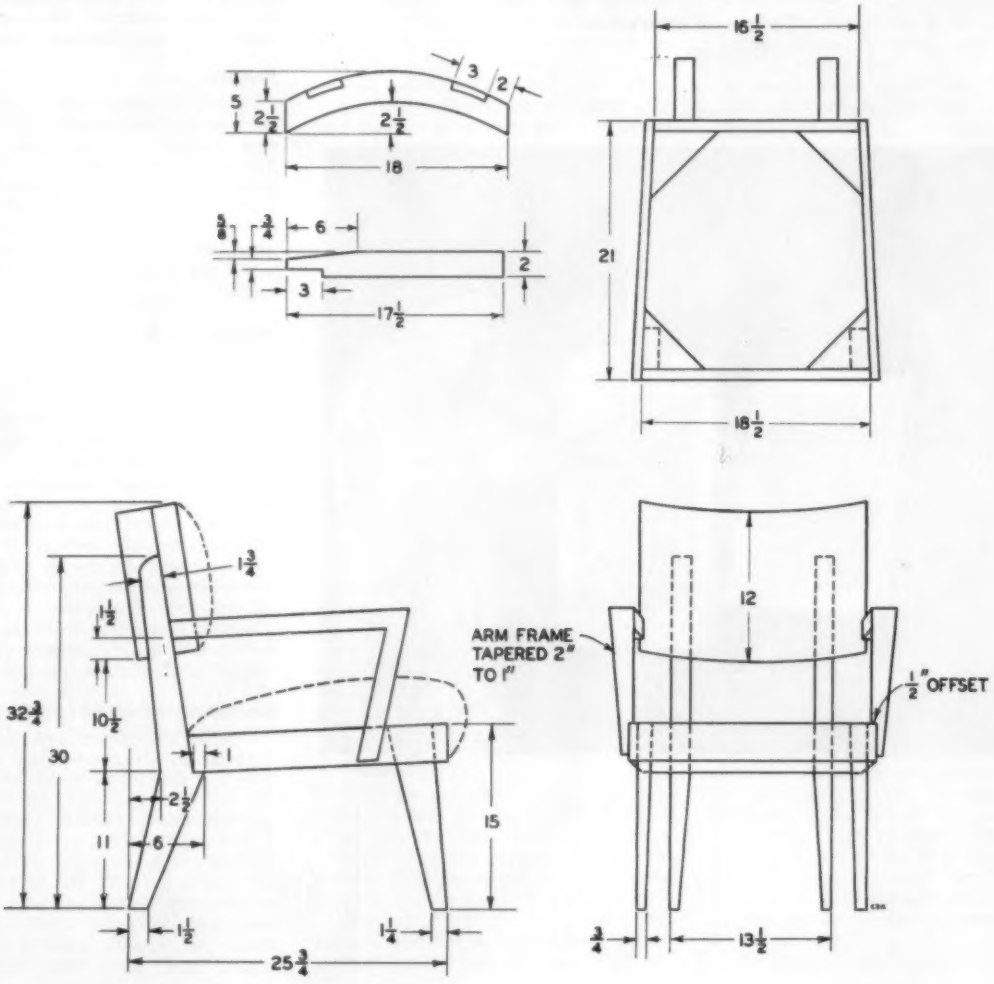
6. Bore and countersink rear legs and screw back into place (check the level of the back).

7. Bore and countersink the arms for ¼ in. carr. bolts to the seat and screws to the back.

8. Turn (or buy) button plugs to fit all counter bores, finish and glue in place.

9. Tack a dark cotton fabric to the bottom to serve as a dust cover and to give the chair a finished look.

10. Install furniture glides.



▶ consider this challenging area of the general shop program —

SPRAYING ON TEXTILES

ROBERT McWILLIAMS
Associate Professor of Industrial Arts
State University of New York
College of Education
Oswego, N. Y.

Spraying on textile materials can be a fascinating and challenging part of the general shop program and the process itself is simple. Construction of the required setup is not difficult and the results are attractive enough to please students of any age or ability.

Women in summer classes have been thrilled with their accomplishments. Young or old, they seem to find satisfaction in expressing their own special ideas in the distribution of color and highlights on a textured material. Students at college level are pleased with the finished product of their own creative imagination. Children, even those in elementary grades, have given up play to arrange an attractive piece, with weeds and flowers they have picked and then finished with gay colors. Any one piece can be finished in less than one hour without the use of expensive power spray equipment.

The process itself is simply a matter of arranging figures, cut from almost any suitable scraps, on the chosen material. Pinned-down vines, flowers or weeds can be arranged into most attractive patterns and designs. Then, with the use of the new lacquer or enamel sprays, a silhouette of these figures can be produced upon the material, some parts of which are shadowed and others delicately highlighted.

Projects

Here is an opportunity to make pictures to put into those frames made in your general shop as regular projects. Also consider the following projects for spraying: hooked rug patterns, pillow covers, bench covers, radio and TV grill covers, café curtains, lamp shades, skirts and aprons, draperies and shades, scarfs and neckties, screen panels, room dividers, and banners.

Selection of Materials

Depending upon the project to be made, a supply of the following materials should be available: burlap for hooked rugs, monks cloth for background of display, broadcloth for shirts, velvet for skirts, drapes and pictures, brushed or napped rayon and linen for many projects. Spraying also works well on pebble board and Celotex squares commonly used on ceilings.

Colors today are usually brilliant and permanent and attractive. Their use on different fabrics produces a variety of effects. Use of colors in this way is new and should encourage students to do original work with ease and pleasure.

Kinds and Colors of Paint

Push-button lacquers and enamels are available in about seventeen colors. A 6 oz. can sells for 98 cents and a 16 oz. can for not more than $1.69. Out of the many colors available, a minimum of a dozen should be kept in stock. It is necessary to have several different tones and shades available for use to provide variety in shading and highlighting. The following colors are basic for a beginner: silver, gold, white, glossy-black, copper tone, baby blue, baby pink,

chrome yellow, cherry red, regal blue, green, and orange. Careful observation should be made of the drying time of each individual color. Some dry in ten minutes; others take hours. After removing pattern pieces, the sprayed material should not be handled until thoroughly dry.

Selecting Design Material

Nature provides much material with which to work. Examples are ferns, morning glories, vines of all types, sea weed, pine boughs, and various flowers. In many cases, some of the natural growth has to be cut away or trimmed to allow the spray to form a silhouette. It may be necessary to bend and adjust whatever material is used to produce the most artistic arrangement possible.

Original abstract designs are an important and challenging part of this type of decoration. The best definition of abstraction may be that in an abstract design, objects tend to lose their identity as objects and to exist as pure form. When first contemplating such a design, an arrangement of lines, shapes, figures and textures is a primary step. Material for this is always at hand in abundance in the scrap box or in the wood or metal areas of your own shop.

Original designs could be cut out of paper, cardboard, leather or rubber matting. Other interesting sources for developing design are pieces of lace, open mesh, looped or novelty yarns, and woven materials that have been frayed.

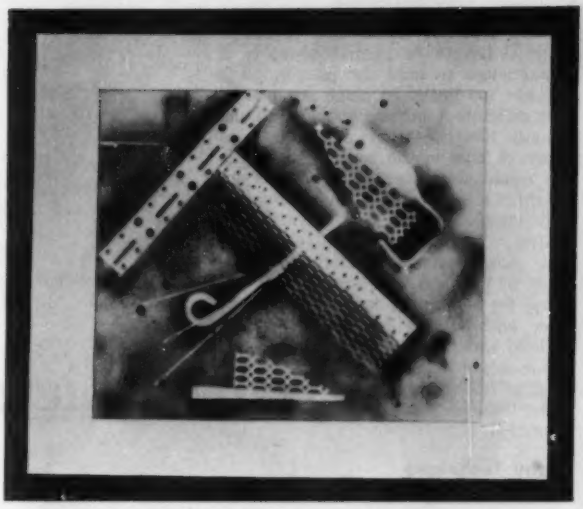
Jewelry, trinkets and many common household articles when skillfully placed on a colorful background can prove their worth. The designer finds himself appraising even the most ordinary objects when in quest for new creations.

Selecting and Using Color

An explanation of the selection and use of color is not a simple matter. Many books have been written on this subject alone. Artists' views concerning good harmony and color blending vary considerably whether ideas for their formation are taken from the Brewster, Munsell, or any other theory. For the beginner, it is important to know that there are five basic harmonies to consider when a project is to be colored, and all color schemes are based on the three primaries, red, yellow, and blue.

Complementary colors are directly opposite in the color wheel, green opposite red, violet opposite yellow, and orange opposite blue. By the use of these complements, harmony is achieved. The next thought is to darken or lighten them with black or white to produce various values.

Another popular harmony is the monochromatic, that is, tints and shades of one color. The use of one color with amounts of black or white produces the graduations. For example, spray material having red in one hand, black or white in the other by standing three feet from the material and allow the spray from the can held in one hand to blend with the color held in the other about one foot from the goods. This often produces a misty effect.



pictures, rugs, pillowslips, curtains, draperies, etc. — many projects are possible with this process.

Third in importance is the split-complement harmony. This is the one that forms a "Y" on the color wheel. Instead of using the color directly opposite the main one chosen, those on either side of the opposite color are used. Blue-green and yellow-green are used with red instead of a pure green. Keep in mind that black, gray and white are absence of all color and can be used in any harmony.

Fourth, an analogous harmony is one of neighboring colors. It comprises the use of cold colors, greens and blues or the warm colors, yellow, orange, and red which will be found around the outside of the color wheel.

In the Triad harmony, a triangle is formed upon the wheel. Such colors as red, yellow and blue for a harmony or orange, green and violet. Here one color is selected to predominate and modify the others for contrast.

In the selection of color, two things should be kept in mind. Maintain enough contrast in the colors so that whole pattern does not fade away and try to avoid colors that vibrate. Some blues and reds touching each other cause a disturbance and are not restful. This is the same with some other brilliant colors. The design to be used should be studied to give it proper highlight in certain places. Assume a light is coming in on one side. Consider where shadows would be and where the highlights would fall.

A Suggestion

Pin down and spray a pine bow on a white napped rayon material. Spray a green over the main stems and a lesser amount of green throughout all the needles. Highlight openings with bronze, possibly a little light blue for the sky or the top of picture. Concentrate the green at the base and add a little red for richness and depth of color. Pull all pins and remove pine bow. Hang up to dry.

Experiments With Pattern Warp Yarns

Spray a design on a set of warp threads. Draw all closely spaced warp forward with a dowel rod in front of the loom. Slide under these warp, a piece of masonite on top of which should be a piece of corrugated board, then white napped rayon or velvet. Comb the warp evenly, pin down leaf effect, and spray using dark colors.

After a short drying time, remove the pins, cloth, corrugated cardboard, masonite, and roll back the warp on the warp beam. Keep warp taut while winding, using the dowel rod in front of the loom for tension.

Weave with one shuttle using a light rayon-metallic filling and beat loosely about six to eight rows per inch. This will allow the patterned warp to show on the surface.

Another interesting effect can be produced if one harness contains white looped yarns and the other a fine plain yarn. Follow the above procedure with this exception. Spray only the looped yarns keeping the plain yarns below the masonite. This will produce a filling or weft effect with the metallic yarn.

The Spray Booth

A temporary booth could be made of a large corrugated box, the top of which would have to be cut and rolled back to allow the project to be seen. A smaller corrugated box cut low in front and higher in back, should be made to slide inside the larger box. Place it with the bottom up to hold the material to be sprayed. This box surface should be tilted from 20 to 45 degrees depending upon the height of the individual working and the pattern used. For example, if heavy objects are used to form the pattern, the tilt of the inner box should be lessened.

The front end of the small box should

be about two feet from the floor. Corrugated material serves well if design material has to be pinned down. It is firm enough to hold the pins in place and not too heavy to make removal of pins difficult. A curtain should be hung around the booth to absorb surplus spray. A hole in the back of the large box would aid in ventilation. The room in which the spraying is done should be well ventilated but free from strong drafts.

A more permanent booth could be made of plywood with some heavy material for enclosing drapes plus a low table with adjustable top and section to hold spray cans. An electric fan and a flue would help to keep fumes in one section of the shop. Experimentation along these lines will prove exactly what is needed.

Spray Technique

Shake can vigorously and run a test just off to one side of the project. Hold can approximately one to three feet away from the project. Press button firmly for a fine spray, release pressure gradually to produce heavier particles. Avoid too many layers of spray as the fabric will become stiff.

Blend colors by spraying with a well-shaken can in each hand. Example: red and blue to make violet. When you have reached the right shade and density of color, pull can rapidly away from project to avoid the dripping of heavy particles of color. Limit your colors to about three or four in beginning projects.

Half and quarter tones may be produced by taking off some parts of the design ahead of others and spraying that special unit lightly. When all design material has been removed, spray certain parts again to reduce the heavy contrast or to make a better color balance.

The whole design may be sprayed with a gold, silver or similar color to subdue the contrast or give some added pleasing effects. CAUTION: Know your color and exact position of pin point in can to be used.

Suggestions:

1. Neutral colored materials such as white, gray and black, serve well as background material. Napped rayon or velvet give the best results as stems will be imbedded in this raised surface.
2. Blow down on pinned designs to see if they are secure in most places. It may be desirable not to pin too well so that the spray can creep under in various places.
3. A piece of cardboard in one hand and held over a section not to be sprayed will help to keep the spray in a concentrated spot.
4. A good supply of common pins is needed for designs made of light weight materials.
5. A clothes line and snap-on clothespins should be made available.
6. Added interest and challenge could be to use a brayer and block printing inks on an abstract figure then spray the background.

IA/VE
special / report

opportunities for summer growth for industrial educators

— University of Washington

the summer months represent a golden, annual opportunity for professional advancement, and here i a reports on some means toward this goal, with emphasis on summer schools

▶ summer schools: a vital key to —

Professional Excellence

CHRIS H. GRONEMAN

The current decade has numerous designations. One of these has professional connotation, "The Scientific Sixties." Implications for such an era might well be applied to our teaching and the industrial technological environment in which we live. We in industrial teacher education are expected to understand and interpret the modern technology, and adapt it through teaching concepts to prospective teachers. The young men and women who became industrial teachers are prone to teach for a number of years immediately following their graduation from a teacher education program as they were taught. It is imperative, therefore, that the teacher education profession take cognizance of this tendency and set the most progressive example possible.

This means that the teacher of today, engaged in interpreting industry, must have the benefit of a thorough and comprehensive program in his educational preparation. He must acquaint himself with the newest materials, techniques, and occupational opportunities of industry. Not only is the modern teacher expected to keep abreast of industrial and technological developments, he must understand and appreciate some of the basic philosophies of our educational systems. An adequate general education probably cannot be obtained today in the normal four-year undergraduate industrial teacher preparation program. To realize and understand our rapidly expanding industrial economy and the sociological changes, we must achieve more than one culture or one discipline. It is increasingly important that industrial teachers, regardless of formal education and degree accomplishments, plan an active program of personal, continual upgrading, and achieve a development of their potentialities for greater success in their careers.

A person can grow to the height of his potentialities when he knows his desires, interests, values, and potentialities; has the opportunity to develop them through education; knows about the complex rapidly changing career horizon; and is motivated to develop his abilities and relate them to the opportunities of competitive society.

The Opportunities of Summer Schools

Summer school is one of the answers to this competition, and is currently one of the short-term opportunities for personal growth toward professional excellence. We have now come to the point in our profession where we must think in terms of highest achievement, efficiency of teaching, and personal responsibility in doing the best job possible. We could term this area of knowledge "professional excellence" to denote that portion of the teacher population which has taken advantage of professional opportunities. Average performance is no longer an excuse or answer to modern teaching challenges. Excellence in our profession must be achieved to maintain the dignity due our teaching field. Ever increasing competition from other areas of our formal cultures requires our best efforts.

Emphasis is being placed today upon a more intense preparation and technological background in the formal education disciplines of mathemathics and sciences. Perhaps the question should be asked whether or not we are getting complacent, due to the apparent success and progress which has been accomplished in the past 25 years. The law of survival of the fittest will always prevail, and teachers could find themselves in a field of decreasing interests, and lower enrollments, caused by their failure to recognize the professional excellence which is being stressed in the disciplines mentioned. Alert teachers in these fields are taking advantage of the fine, interesting opportunities afforded them through workshops, institutes, upgrading sessions, short courses, and summer schools.

Teacher education is a continuing education. The first four years, comprising the formal education up to the baccalaureate degree, is only a beginning which must be continued through personal, professional improvement. Society demands much in the complex interchange of ideas, performance, and personal responsibility. Part of the problem with the fomalized education program is the greater percentage of people pursuing formal education. This means there is a diversity of talents and a wider spread of intelligence level among all students. Graduate study and summer school improvement are the laboratories of our profession. Everyone with a keen professional interest strives for success, and these offer the opportunity to "get on with the job."

An Active Process

Professional growth is an active process. It is that period of time during which we can re-evaluate the meaning of specific educational areas. It should be a continuous process as long as we live. During the professional growth period we are obligated to take a new look at our preparation in industrial arts or vocational industrial education. We should determine if sufficient provision has been, or is

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being made to provide for the basic information in the sciences and mathematics to understand the newer developments of our ever expanding industrial technology. Those in pursuit of professional excellence often need counseling and advice by educators, not in their specific field, from time to time, to help adapt their activities and objectives to modern requirements. Such assistance can readily be obtained through summer school attendance. It is also there that the most recent techniques in obtaining, recording, and interpreting student information may be acquired.

Professional growth toward excellence must be an active process, therefore teachers must be vocal about making their needs known. Graduate or upgrading courses should be selected and planned on the basis of desire and an analysis of modern developments. Teacher graduate and in-service courses should have definite, specific, timely problems on which to work, and the professional improvement through formal education should be acknowledged valuable only when studies and self-analysis are made, surveys undertaken, and personal enterprise exhibited.

Growth professionally is not only through the content of graduate and in-service courses, but is obtained through association in studies with co-workers in our field. Graduate study assists in developing professional excellence by providing opportunities for continually re-assessing the role of industrial teachers in the modern school system, by expanding the opportunities to learn and acquire newer concepts, by developing a systematic and dynamic approach to educational problems of current import, and by offering the means with which to plan a long-range program of effective service culminating in personal achievement on the level of professional excellence.

Financial Rewards

The January, 1958, issue of the *School Board Journal* states that a growing number of city school systems are now paying higher salaries to teachers who have gone beyond the master's degree level in formal education. This should be further encouragement to pursue additional education, even though one has been awarded that degree. The Grosse Point, Mich., professional growth program has shown that professional teachers have no objection toward associating their salary prospects to evidences of professional growth. This concept improves the overall level of teaching, because all teachers have the opportunity to prove their abilities through additional studies. This sets up a merit rating program which is not an automatic increment type of salary schedule. From this the idea and the challenge to add to professional knowledge through additional study in order to grow professionally as well as financially is stimulated and accepted.

The pursuit of additional education for professional advancement is a matter of utilization of human potentialities. According to the *Personnel and Guidance Journal* of March, 1958, this type of utilization depends upon two factors: (1) the nation's decisions to turn or direct needed educated talent toward national usage, and (2) the maximum growth of human talent through our educational processes. The idea behind this philosophy and concept is that further study helps the nation's need for educated talent as well as the individual. A statement released by the executive council of the American Personnel and Guidance Association asserts that the present waste of human resources must be alleviated. This would strongly suggest that there is a great amount of untrapped resources within our profession which should be further explored and, perhaps, exploited, in an effort to achieve the professional excellence which is imperative in the survival of a functional education such as is advocated.

Success is a journey, and not a destination. Hence that point of achievement is never fully realized, but only expanded to open up new horizons in which to develop professional excellence. ◀

a guide to summer schools

Here is a survey of those summer schools teaching industrial education subjects compiled to assist you in planning your summer program. (Generic courses are listed only, e.g., under "woods" several specific courses — such as hand, machine, finishing, etc. — may be offered.) For further information write to the source indicated with each listing.

Alabama

University of Alabama, University

First term, June 6 to July 13; second term, July 14 to August 19; g and ug;* woods, machine, handicrafts, general shop, professional; write C. E. Williams, director.

Arizona

Arizona State College, Flagstaff

First term, June 13 to July 15; second term, July 18 to August 19; g and ug; drafting, woodwork, electricity and electronics, professional; write Robert E. Turner, associate professor of industrial education.

Arizona State University, Tempe

First term, June 13 to July 16; second term, July 18 to August 20; g and ug; drafting, graphic arts, upholstery, wood, metals, electricity, professional, design, electronics, machine shop, sheet metal, auto mechanics; write R. C. Rice, director.

*g is graduate and ug is undergraduate.

Arkansas

State Teachers College, Conway

First term, May 30 to July 1; second term, July 5 to August 5; g and ug; general shop, drafting, foundry, metals, professional; write E. W. Packard, head, industrial education department.

California

Fresno State College, Fresno

G and ug; metals, wood, handicrafts, electricity, professional; write E. M. Spencer, dean.

Chico State College, Chico

June 20 to July 29; drafting, electricity-electronics, metals, wood, leather, general shop, professional; write Glenn Duncan.

Los Angeles Harbor College, Wilmington

July 5 to August 12; ug; electronics, printing, architectural; write dean.

Los Angeles State College, Los Angeles 32

First term, June 20 to July 29; Post term, August 1 to August 26; ug; photography, drafting, electronics, graphic arts, handicrafts, metal, professional; write J. A. Morton, dean of educational services.

Long Beach State College, Long Beach 4

June 20 to July 29; g and ug; write C. Thomas Dean, chairman of the division of industrial arts.

Pacific Union College, Angwin

First term, June 13 to July 7; second term, July 10 to August 4; g and ug; wood, arts and crafts, drafting, professional; write office of the registrar.

Sacramento State College, Sacramento

Ug; professional; write dean.

San Diego State College, San Diego

June 27 to August 5; g and ug; drafting, wood, graphic arts, handicrafts, general shop, professional; write K. Phillips, industrial arts department.

San Francisco State College, San Francisco 27

First term June 27 to August 5; post term, August 8 to 26; g and ug; technology, design, professional; write dean.

San Jose State College, San Jose 14

First term, June 27 to August 5; second term, August 8 to Sept. 2; g and ug; drawing, wood, metals, graphic arts, design, furniture and upholstery, lapidary, professional; write J. H. West, dean of educational services.

Colorado

Adams State College, Alamosa

First term, June 13 to July 15; second term, July 18 to August 18; full ten-week term, June 13 to August 19; ug; drafting, woods, welding, metals, professional; write K. R. McKinney, director.

Colorado State College, Greeley

Pre-term, June 13 to 23; regular term, June 27 to August 19; g and ug; professional, woods, drafting, metals, graphic arts, bookbinding, leather, plastics, electricity; write K. F. Perry, chairman, division of arts.

Connecticut

Central Connecticut State College, New Britain

June 27 to August 5; g and ug; handicrafts, electricity-electronics, graphic arts, metals, professional; write the director.

Hawai

University of Hawaii, Honolulu

June 20 to August 1; 215 courses in 39 fields; write to Dr. Robert E. Cralle, University Study Tours to Hawaii, 3305 Wilshire Blvd., Los Angeles 5, Calif.

Idaho

Boise Junior College, Boise

June 6 to 10; ug; professional. Write S. R. Glenn, state supervisor of trade and industrial education, 610 Main St., Boise.

University of Idaho, Moscow

Full session, June 13 to August 5; g and ug; woods, handicrafts; professional; write Thomas F. Wahle, director.

Illinois

Southern Illinois University, Carbondale

June 20 to August 8; g and ug; woods, machine shop, handicrafts, professional; write Willis Malone, director of admissions.

Chicago Teachers College, Chicago

June 27 to August 19, g and ug; handicrafts, woods, graphic arts, drafting, electricity, graphic arts, professional; write Coleman Hewitt, chairman.

Western Illinois University, Macomb

First term, June 6 to July 15; second term, July 15 to August 19; g and ug; woods, drafting, graphic arts, handicrafts, electricity, professional; write Carlson Crane, director.

Bradley University, Peoria

First term, June 13 to July 16; second term, July 18 to August 20; g and ug; handicrafts, automotive, building construction, electricity, drafting, metals, woods, professional; write Asa Carter, director.

Indiana

Indiana University, Bloomington

Interterm, June 1 to June 15; regular term, June 15 to August 12; short term, August 12 to 27; g and ug; professional; write office of the registrar.

Ball State Teachers College, Muncie

First term, June 13 to July 15; second term, July 18 to August 19; g and ug; drafting, woods, metals, electricity, power and transportation, graphic arts, building construction, design, electronics, aviation, handicrafts, graphic arts, professional; write Dr. Lloyd P. Nelson, head, department of industrial arts.

Indiana State Teachers College, Terre Haute

First term, June 13 to July 19; second term, July 20 to August 24; g and ug; write Sylvan A. Yager, chairman, department of industrial education.

Iowa

Westmar College, Le Mars

May 31 to July 7; woods, drafting, professional; write to registrar.

Kansas

Bethel College, North Newton

First term, May 31 to July 8; second term, July 11 to August 5; third term, August 8 to August 26; ug; metals, welding, machine shop, woods; write Eldon W. Graber, director.

Kansas State College, Pittsburg

June 8 to August 9; g and ug; auto mechanics, drafting, design, metals, graphic arts, woods, professional; write Paul T. Dixon, director.

University of Wichita, Wichita

June 13 to July 23; ug; cabinetmaking, woodturning, professional; write A. D. Cox.

Louisiana

Southwestern Louisiana Institute, Lafayette

June 6 to August 5; ug; woods, cabinetmaking, metals, electricity, graphic arts, motor mechanics, professional; write Paul J. Van Horn, head, industrial arts department.

Southeastern Louisiana College, Hammond

May 31 to August 6; ug; woods, woodturning, motor mechanics, metals, handicrafts, professional; write to registrar.

Maine

University of Maine, (courses being offered at Gorham State Teachers College, Gorham)

June 27 to August 5; g and ug; general shop, electricity-electronics, professional; write to Dr. John Mitchell, Gorham, or Dean of graduate study, University of Maine, Orono.

Michigan

Central Michigan University, Mt. Pleasant

June 20 to July 29; g and ug; drafting, woods, metals, patternmaking, welding, professional; write Cleon C. Richtmayer, director of summer session.

Eastern Michigan University, Ypsilanti

June 20 to July 29; g and ug; woods, drafting, handicrafts, metals, professional; write R. Stanley Gex, director.

Flint Community Junior College, Flint

June 20 to August 12; ug; drafting, elec-

a directory to summer placement

Interested in up-to-date information on summer jobs, projects, etc.? The 1960 annual Summer Placement Directory has a listing of over 12,000 summer opportunities for earning. Recreational, student training programs in industry, study projects, and similar situations have been submitted for the directory and each listing includes job descriptions, dates of employment, qualifications, number of openings, salaries, and names and addresses of employers. If a copy is not available at your placement office or library, write The Advancement and Placement Institute, Box 99N, Station G Brooklyn 22, N. Y. Price is $2.00.

summer workshops

▶ **The Fifth Annual Minnesota Industrial Arts Summer Work Shop, sponsored by Birch Coulee Industrial Arts Club in co-operation with Bemidji State College and the Vocational Division of the Minnesota Department of Education will be held at the State F.F.A. Camp on Lake Arrowhead, 15 miles north of Virginia, Minn., on Highway 53.**

The work shop is scheduled to be conducted during the Week of August 14 to 22, 1960. Two quarter hours college credit will be granted to all registrants who successfully complete the workshop.

The field of industrial education to be covered this year will be in the new and popular area of "Small Engines."

▶ **The industrial education department at Southern Illinois University, Carbondale, is offering as part of their summer program, June 20 through August 12, a series of short courses in which outstanding industrial and educational specialists will conduct discussions on the latest developments and trends in the industrial education and technical fields.**

Students may register for one or more of the two-week intensive courses offered at four different times during the summer session.

tricity; write Dean Buzzard, director, or Clarence Haines, chairman, applied science department.

Northern Michigan College, Marquette
June 20 to July 29; g and ug; drafting, woods, professional; write registrar.

Western Michigan University, Kalamazoo
June 20 to July 29; post term, Aug. 1 to 12; g and ug; woods, metals, machine shop practices, drafting, electricity, handicrafts, professional; write to Dr. George Kohrman, dean, school of applied arts and sciences.

Minnesota

Bemidji State College, Bemidji
First term, June 6 to July 13; second term, July 13 to August 19; g and ug; woods, furniture construction, woodturning, plastics and leather, auto mechanics, professional; write to Registrar, Bemidji State College.

Moorhead State College, Moorhead
First term, June 13 to July 20; second term, July 20 to August 26; g and ug; write Marlowe Wegner, chairman of department or Robert Hanson, registrar.

University of Minnesota, Minneapolis 14
G and ug; professional; write dean of industrial education.

Winona State College, Winona
First term, June 8 to July 15; second term, July 18 to August 20; g and ug; professional, woods, machine shop; write H. R. Jackson.

Mississippi

Mississippi Southern College, Hattiesburg
First term, June 7 to August 21; second term, July 18 to August 21; g and ug; professional; write Ralph Owings, dean of the school of education and psychology, Box 24, Station A.

Mississippi State University, State College
First term, June 6 to July 15; second term, July 18 to August 20; g and ug; woods, handicrafts, electricity, professional; write E. F. Mitchell, head, department of industrial education, Box, 455.

Missouri

Northeast Missouri State Teachers College, Kirksville
June 6 to August 11; g and ug; handicrafts, woods, metals, automotive and aviation, drafting, professional; write Otho Barnett, head of the division of practical arts.

Central Missouri State College, Warrensburg
G and ug; woods, general shop, drafting, photography, machine woodwork, handicrafts, professional; write Noel B. Grinstead, chairman, industrial arts department.

Northwest Missouri State College, Maryville
First term, June 6 to July 1; second term, July 5 to August 4; machine woodworking, drafting, wood turning, professional; write registrar.

Southeast Missouri State College, Cape Girardeau
June 2 to July 28; g and ug; drafting, woods, metals, professional. Write Amos G. Williams, head, industrial arts department.

Southwest Missouri State College, Springfield
June 1 to August 2; g and ug; general shop, drafting, metals, electricity, woods, professional. Write registrar.

University of Missouri, Columbia
June 13 to August 5; g and ug; electricity, metals, professional; write H. H. London, 202 Industrial Arts Bldg.

Nebraska

Nebraska State Teachers College, Peru
June 6 to July 29; g and ug; electronics, welding, woods, handicrafts, metals, drafting, professional; write Owen Harlan.

New Hampshire

Keene Teachers College, Keene
First course, June 27 to July 15; second course, July 18 to August 5, g and ug; professional; write Frank E. Tisdale, head, industrial education department.

New Jersey

Montclair State College, Montclair
June 28 to August 5; g and ug; professional; write Edward J. Ambry, director.

New Mexico

Eastern New Mexico University, Portales
June 20 to August 12; g and ug; professional; write Martin L. Cole, director.

New Mexico Western College, Silver City
June 13 to August 4; g and ug; metals, graphic arts, professional; write chairman, department of industrial education, or director of admissions and records.

New York

Columbia University, Teachers College, New York City
July 5 to August 12; g; drafting, metals, woods, handicrafts, professional; write William Mahoney.

New York University, School of Education, New York City
Interterm, June 7 to July 1, regular term, July 6 to August 12, post-term, August 15 to Sept. 9; g and ug; handicrafts, professional; write Raymond Van Tassel, chairman, department of vocational education.

State University of New York, Oswego
First term, July 5 to August 12; post term, August 15 to 26; g and ug; drafting, transportation, ceramics, textiles, graphic arts, professional; write J. S. Dunham.

State University of New York, College for Teachers, Buffalo
July 5 to August 12; g; electronics, woods, metals, professional.
July 5 to August 26; g; electricity, transportation, handicrafts, professional; write Steven Gittler, director.

North Carolina

East Carolina College, Greenville
First term, June 6 to July 12; second term, July 13 to August 18; g and ug; graphic arts, woods, metals, electricity, professional; write Kenneth L. Bing, chairman, industrial arts department.

North Carolina State College, Raleigh
First term, June 13 to July 21; second term, July 21 to August 26; g and ug; professional; write J. Bryant Kirkland, dean, school of education.

Western Carolina College, Cullowhee
First term, June 6 to July 16; second term, July 18 to August 19; ug; design, handicrafts, photography, professional; write W. B. Harrill, director.

North Dakota

University of North Dakota, Grand Forks
June 13 to August 6; g and ug; electronics, professional; write M. F. Poyzer, chairman, department of industrial arts.

State Teachers College, Minot
June 13 to August 5; ug; handicrafts, drafting, woods; write C. R. Mills, chairman, department of fine and applied arts.

Ohio

Bowling Green State University, Bowling Green
First term, June 13 to July 15; g and ug; graphic arts, professional; write director.

Miami University, Oxford
First term, June 21 to July 26; second term, July 27 to August 31; ug; woods, furniture, drafting, design, handicrafts, plastics, metals, professional; write William Stoner, chairman, IAE department.

Ohio Northern University, Ada
First term, June 14 to July 15; second term, July 18 to August 19; ug; handicrafts, woods, photography, professional; write dean.

Ohio University, Athens
First term, June 13 to July 15; two-week term, July 5 to 15; second term, July 18 to August 19; g and ug; electricity and electronics, graphic arts, woods, handicrafts, professional; write F. H. McKelvey, director.

University of Cincinnati, Cincinnati
Interterm, June 6 to 17; first term, June 17 to July 22; second term, July 23 to August 26; g and ug; professional; write to Dr. Spencer Shank, dean.

Wilmington College, Wilmington
First term, June 13 to July 16; second term, July 18 to August 19; ug; woods, plastics, electricity, professional; write Graydon W. Yaple, director.

Oklahoma

Oklahoma State University, Stillwater
June 8 to August 5; g and ug; professional; write office of admissions and records.

Oklahoma State University, Stillwater
June 6 to August 5; g; professional; write Cary L. Hill, head, department of industrial arts education.

Oregon

Oregon State College, Corvallis
June 21 to August 12; post term, August 15 to 26; g and ug; graphic arts, patternmaking, woods, metals, furniture design and construction, carpentry and building construction, forging and welding, machine shop practices, electricity, lapidary techniques, automotive, professional; write to registrar.

Pennsylvania

Carnegie Institute of Technology, Pittsburgh
June 27 to August 5; ug; graphic arts; write J. M. Daniels, chairman of admissions.

Pennsylvania State University, University Park
July 5 to August 12; g and ug; professional; write S. Lewis Land, head, department of industrial education.

State Teachers College, Millersville
First term, June 6 to July 15; second term, July 18 to August 26; g and ug; fundamentals of woods, metals, graphic arts, electricity, drafting, general shop, design, professional; write A. G. Breidenstine, dean.

University of Pennsylvania, Philadelphia
June 27 to August 5; twelve-week courses beginning June 13; g; professional courses.

(Continued on page 83)

"Built-in Extras" make

DURO POWER TOOLS

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REACTIONS

(Concluded from page 27)

the results will be an integrated program of instruction. Industrial arts activity should serve as the correlating function between student ability groupings and the subject areas of social studies, science, and language arts.

In the kindergarten through the sixth grade industrial arts could be carried on with a few simple hand tools and such materials as clay, cardboard, thin wood, leather, sand, cork, wire, plaster, and sheet metal. In many elementary schools industrial arts is a phase of the total educational experience and is under the guidance of the regular teacher, in a self-contained classroom. Professionally trained industrial arts teachers should be called upon to give leadership and general supervision to such offerings.

Industrial Arts in Junior High Schools

Industrial arts as general education in junior high schools, grades 7–9, should be maintained in multiple-activity shops by professionally qualified industrial arts teachers:

1. to provide general basic exploratory experience in woodworking, metalworking, electricity, power mechanics, graphic arts, drafting, and industrial crafts. The outcomes should be directed at:
   a) the development of a degree of skill in the use and understanding of tools, machines, and devices that are used by the household handyman.
   b) the development of an appreciation of industrial design, good craftsmanship, appropriate materials, and sound construction to help Americans select and judge the products of industry.
   c) the opportunity for boys and girls to do research, and plan the projects (within practical limits) for the work they wish to do with tools and materials.
   d) to help students assess their *abilities, interests,* and *potentialities* for preparation and employment as technicians, tradesmen, scientists, industrial education teachers, and engineers (as a contribution to educational and vocational guidance).
   e) exploration in several of the leisure time industrial craft activities in which people engage.
2. to provide opportunity for students to assume responsibility in organizing and maintaining industrial arts activities, to develop safe work habits and desired interpersonal relationships in work situations.
3. to provide information about industrial and related occupations, to provide for an understanding of American industry for the educational and vocational guidance of youth. Such information should be general in character and devoid of too much detail.

Industrial Education in Comprehensive High Schools

Industrial education in the comprehensive high schools of the United States, grades 10–12, should be maintained in shops, laboratories, or drafting rooms especially designed and equipped:

1. to provide a comprehensive curriculum to meet the specific needs of students with varying abilities, aptitudes, desires, and interests. This calls for an instructional program:
   a) for the student (or group of students as a team) with a burning interest in one or more of the industrial arts activities to do intensive research and planning, use modern tools and machines, and to use the most appropriate materials in the construction of a project. The emphasis should be on problem solving and the application of scientific principles through creative manipulative experiences.
   b) to provide fundamental and essential occupational preparation for selected students entering industrial occupations from high school. (Such as: Industrial drafting, automotive mechanics, and servicing industrial products.)
   c) with basic courses in industrial mechanics with content cast in industrial chemistry, electricity and electronics, hydraulics, machine shop, industrial drafting and descriptive geometry, basic power systems, instrumentation and automation, and applied physics and mathematics for college-bound students planning to become technicians, engineers, or industrial education teachers.
   d) that includes a home planning course to help young men and women develop skills and insights needed to intelligently plan for their homes.
2. to provide an interesting and effective learning climate for youth that may be adapted to their individual differences and needs.[1]

No attempt has been made to label the statements for the comprehensive high school as "industrial arts" or for "vocational-industrial education." To avoid this controversy what is being advocated for the senior high school has been listed under "industrial education," which I define as:

Industrial education: A generic term used in referring to industrial arts, vocational-industrial education, industrial training, technical education, apprenticeship, and the offerings of private trade schools. It is concerned with education for living in a technological world: the quest for human values in an industrial civilization.

Much of the controversy at the senior high school level has come from those who have failed to recognize that we need industrial education offerings in comprehensive high schools, that contribute to the fulfillment of goals for selected and specialization groups, as well as those that contribute to general education.

My interpretation of depth versus breadth in the industrial arts differs from that expressed by Professor Duffy. I think the team of outstanding youth, for example, that researched, designed, constructed, and successfully fired the rocket under the direction of Leo F. Kuhn, at Anchor Bay, Michigan, had a desirable depth experience in the industrial arts.[2]

There are depth factors operating in the industrial arts program in the Tulsa Public Schools that make it possible for those giving leadership to industrial arts to attract more than 80 per cent of the young men in their comprehensive high schools. Mr. Ruley's report shows that the very able youth in that community select the industrial arts that are offered.[3]

It should be observed that persons are carried into "great depth" in a subject or activity as they become interested and engrossed in the work. Exploration, on the other hand, can be exciting to youth as it exposes them to new experiences. It is my theory, therefore, that we should not expect sustained interest in industrial arts at the senior high school level through continued exploration.

In conclusion, may I say that we need to vigorously support the type of comprehensive high school program that is being advocated by Dr. Conant. At this level we need to advocate that a community employ a team of qualified industrial education teachers to maintain the offerings that I am advocating as 1 a, b, c, and d for industrial education in comprehensive high schools.

May I close by commending Professor Duffy for his splendid article. We need more leaders with his foresight and dedication.

[1]G. Harold Silvius, "Functional Aims for Industrial Education in American Schools," *The Industrial Arts Teacher*, XIX, No. 2 (Nov.–Dec., 1959), 11–12. Reprinted from *The News Letter* of the Michigan Industrial Education Society, Vol. XVIII, No. 4 (1958), 29–31.

[2]Leo F. Kuhn, "Model Rocketry in Education," *American Vocational Journal* XXXIV (Oct., 1959), 9.

[3]M. J. Ruley, "How Do You Build Industrial Arts Enrollment?" *American Vocational Journal*, XXXIV (Dec., 1959), 19.

---------- WHAT DO YOU THINK?

(Concluded from page 4)

students the opportunity to express their choices in what they want to make. It does not consider the students' interests, their individual needs, nor their need for exploratory and creative expression.

"In giving students a choice in selecting projects, certain considerations must be taken into account. These are the range in the ability of students, the financial status of the department, the physical set-up of the shop, etc. When a project is student-centered rather than teacher-imposed, there is a decided difference in the class atmosphere in terms of discipline, motivation, student interest, and drive.

"Careful planning for such a program is necessary. Provisions must be made so that:

1. Individuals will have a share in working on projects of their interest and desire.
2. Emphasis is placed on original and creative designs for all projects, rather than having projects all looking alike at the expense of teaching technical procedures to everyone at the same time.
3. Projects which range in scope and sequence are offered.
4. Learning experiences and fundamental processes which teachers want to cover can be integrated with individually selected student projects.
5. Projects can be adjusted to the students' ability, so that both fast and slow students can maintain progress commensurate with their capabilities.
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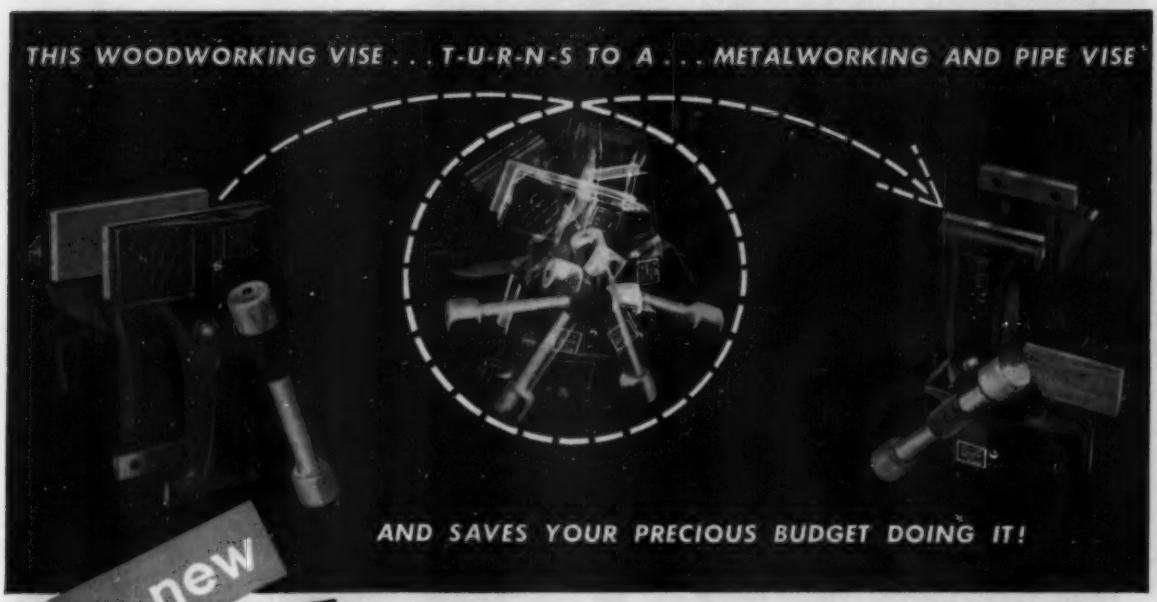

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Tort Liability of Shop Teachers

By Dennis J. Kigin. Paper, 21 pp. Series 74, University of Missouri Bulletin, Columbia, Mo.

The complete title of this useful study is "Tort Liability Affecting Shop Teachers with Provisions for Avoiding Accidents and Litigation." In addition to the risks which every teacher has in teaching children, the shop teacher must face the additional dangers from teaching pupils to use cutting tools and machines; he must provide instruction in the safe use of tools, materials, and shop equipment; he has larger classes than average.

The present study provides basic information on the legal and moral problems which confront the school shop teacher in avoiding accidental harm to students in the industrial arts and vocational shops and in facing his responsibility and legal liability when an accident occurs. The nature and extent of the teacher's liability is outlined and the mitigation of such liability is indicated. The information here given should be at the finger tips of every shop teacher as a part of his professional equipment for his job. It should reassure the teacher that he need have no fears when threatened with a suit so long as he has not been guilty of negligence but has used the ordinary care of a prudent man. It is to be hoped that a future edition of this study will include citations of typical cases and a bibliography.

The study is an essential addition of every city supervisor's office library.

Mathematics and Industrial Arts Education

This bulletin was prepared as a project under the National Defense Education Act by the Mathematics-Industrial Arts Project Committee. Available from the Bureau of Textbooks and Publications, 721 Capitol Ave., Sacramento 14, Calif., $1.

The committee was composed of specialists in the field of mathematics and specialists in the field of industrial arts, and used the results of a two-year study conducted by the California State Department of Education and the Industrial Arts Committee of the California Association for Supervision and Curriculum Development.

The 112-page bulletin is designed to assist in the improvement of the instruction in mathematics courses relating to industrial arts and the practical application of mathematics in each area of industrial arts in grades seven through twelve.

The bulletin will assist both teachers of mathematics and teachers of industrial arts. It contains over three hundred examples of the application of mathematics in seven areas of industrial arts. The seven areas represented are auto mechanics, industrial drawing and drafting, electricity-radio (electronics), graphic arts, handicrafts, general metalworking, and general woodworking.

Each example of an industrial arts activity involving the use of mathematics includes a statement of the nature of the activity, lists the mathematics involved, shows the practical application of the mathematics in a specified industrial arts activity and furnishes keyed references to sources that may be used to secure information needed.

Drafting

By J. W. Giachino and Henry J. Beukema. Cloth, 280 pp., illus., American Technical Society, Chicago, Ill.

The material in this book is planned to provide an organized plan of instruction for acquiring the essential elements of drafting. It would serve as a beginning course for anyone wishing to acquire a basic understanding of drafting. An effort has been made to interpret the principles of drafting according to current practices used in industry.

Chapters include occupational opportunities in drafting, learning to draw, making a layout drawing, lettering a drawing, making a working drawing, drawing sectional views, drawing auxiliary views, learning about assembly drawings and fasteners, how to make pattern drawings, drawing without instruments, planning a home, drawing graphs and charts, and many others.

TV Repair Questions and Answers, Vol. 5

By Sidney Platt. Paper, 120 pp., $2.10. John F. Rider Publisher, Inc., New York 13, N. Y.

This book is intended for the TV technician and the TV servicing student. Electronic theory is kept at a minimum while servicing techniques and procedures are given full consideration.

Each question is followed by an answer giving specific step-by-step procedures and a discussion containing further servicing information.

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Workshop Technology, Part One

By W. A. J. Chapman. Cloth, 311 pp., illus., $3.75. St. Martin's Press, Inc., New York 10, N. Y.

(Concluded on page 56)

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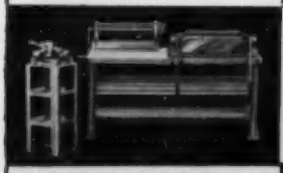

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Aircraft and Missile Design and Maintenance Handbook

By Charles A. Overby. Cloth, 369 pp., $9.75. The Macmillan Co., New York 11, N. Y.

This volume is a practical handbook for mechanics, inspectors, draftsmen, supervisors, designers, modification engineers, and specialists working in aircraft factories, airports, repair and modification centers, and the military services.

It contains 160 tables and 40 figures to illustrate the standard methods of equipment installation and maintenance. The text of the book explains the standards and gives hundreds of tips on the proper handling of materials and tools. The information is applicable to piston-driven and jet planes, helicopters and guided missiles.

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Mathematics Refresher

By Kurt Wolter. Cloth, 96 pp., illus., $3.75. Philosophical Library, New York 16, N. Y.

This book reviews mathematics, beginning with an introduction to arithmetic with literal figures (algebra), and proceeding to calculations with relative numbers, combination of the four fundamental operations, fractions and proportions, equations of the first degree with one unknown, the coordinate system and the graphic solution of equations of the first degree with one unknown, equations of the first degree with two, three, or more unknowns, powers, roots and logarithms, and equations of the second degree with one unknown.

Interaction in Learning: Implications for Television

Prepared by Mrs. Finette P. Foshay. Paper, 64 pp., $1. Division of Audio-Visual Instructional Service, National Education Association, Washington 6, D. C.

This booklet takes a major criticism of educational television — the lack of interaction in the learning process — and presents some suggestions which may alleviate the problem.

According to this report, the obstacles to date in just getting programs on the air have left little time to tailor the programs to the individual needs of the learners. Classroom teachers, curriculum workers and education psychologists have protested that television is a one-way flow which does not allow for give-and-take between students and teachers.

To study this need for interaction, early in 1959, the NEA sponsored a national seminar, to which were invited leading educators from various fields. The group took a good look at the whole learning process and then applied its findings to the role of television in the classroom.

In this report, the group defines interaction, presents conditions within the learning situation, and describes kinds of interaction.

The second half of the report suggests ways in which television's chief limitation — its lack of feedback — might be overcome or circumvented in order to increase TV's effectiveness as a teaching and learning tool.

Do They Understand You?

By Wesley Wiksell. Cloth, 200 pp., illus., $4.95. The Macmillan Co., New York, N. Y.

Here is a book on informal, face-to-face communication. Although directed primarily to people in management, it would prove useful for all persons who want to talk and listen more effectively. The reader will find tools for self-analysis and improved oral communication.

The author believes the key to good oral communication lies in the understanding of one's own attitude and its effect on the listener. He emphasizes the fact that communication does not take place with words alone but that sound, gesture, posture, silence, and facial expression also convey feelings and thoughts. Identifying the obstacles most frequently encountered in communication, the author presents practical suggestions for solving each of them.

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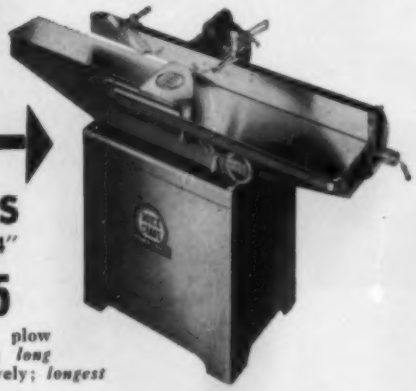

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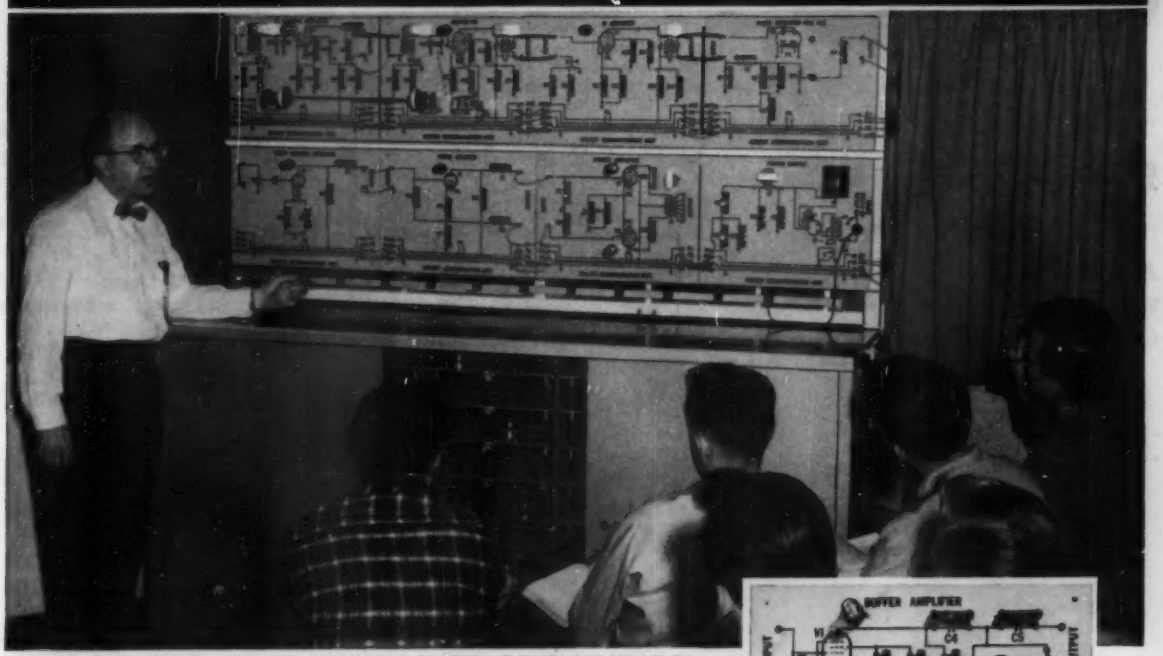

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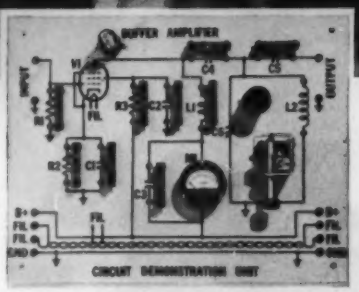

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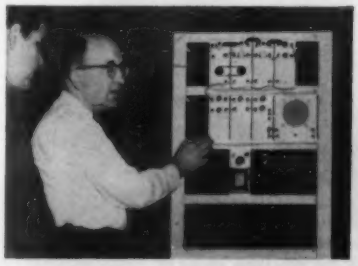

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ASA CATALOG

The American Standards Association, which is the national clearinghouse and co-ordinating agency for voluntary standardization of manufactured goods in the United States, has issued a new list of standards available as of February, 1960. The broad scope of the Association's service will be understood better when it is said that the list includes (1) more than 1900 standards of articles, ranging from acoustics and automotive products to textile and wooden industry materials; (2) about 200 safety standards; (3) nearly 90 consumer goods standards; (4) some 200 recommended internal standards; and (5) special books on standards. The document is available from the American Standards Association, 10 East 40th St., New York 16, N. Y.

INDUSTRIAL TEACHER CONFERENCE AT TEXAS

The twelfth annual industrial teacher conference, sponsored by the Texas Industrial Arts Association, Texas Engineering Extension Service, and the Industrial Education Department of A. & M. College of Texas, College Station, was held February 26 and 27 at the college.

The theme of the two-day conference was "Industrial Arts and the New Age."

Dr. John A. Fuzak, head, industrial education, Michigan State University, East Lansing, was conference consultant.

Welcome E. Wright was program chairman, and Leslie V. Hawkins was the conference director.

Approximately 450 teachers, supervisors, and administrators, representing the states of Texas, Arkansas, and Louisiana, attended.

The two-day session included discussions on the state evaluation committee for industrial-arts, report of Texas curriculum study, craftsmanship in industrial arts, new materials and processes in wood industries, new materials and processes in metal industries, new materials and processes in crafts, electricity and electronics in the junior high and senior high schools, teacher preparation in the fields of electricity and electronics, vocational and industrial education, and demonstration of new processes and techniques in foundry.

Dr. Fuzak's address at the general meeting was on the topic, "Where Are You Going — Up or Out?"

OHIO INDUSTRIAL ARTS ASSOCIATION

The annual convention of the Ohio Industrial Arts Association was held at Neil House, Columbus, Ohio, starting on Thursday afternoon, March 31, and ending on Saturday morning, April 2, with the Ship's Program.

The first session on Thursday afternoon was chaired by Robert Boyer, instructor at Cuyahoga Heights Public Schools, Cleveland.

R. C. Ray, superintendent of Cuyahoga Heights Public Schools, spoke on "A Look at Industrial Education Here and in the U.S.S.R."

Richard O. Knight, president, The Ohio Industrial Arts Association, was chairman of the Thursday evening meeting, at which the topic of discussion was a "Report of the State Level Committee."

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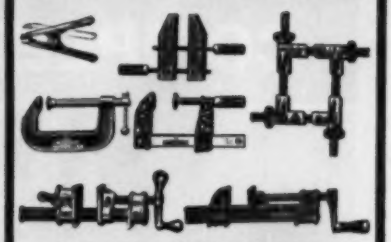

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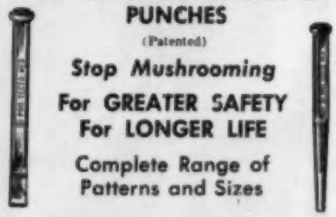

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Committee members were teacher representatives — Robert Wright, Rudy Oaklets, Russell Swigart; college representatives — John J. Michaels, Willis Ray, and Robert Rueggeberg; city supervisors — Charles Eckert, Herbert Detrick, and D. Arthur Bricker; and members ex-officio — P. S. Waldeck and Richard O. Knight.

William R. Mason, supervisor of industrial arts, Cleveland, was chairman of the 9:30 meeting on Friday morning.

Speakers at this session were: Max Lerner, James Reynolds, Harold G. Johns, and Jim Nemestil, and the subject discussed was the "Development of Curriculum Guides."

Ernest R. Stotler, director of industrial arts, Akron, Ohio, public schools, was chairman for the 10:30 a.m. meeting. "Plans for Expansion" was the topic for discussion.

Speakers were D. Arthur Bricker, Ralph R. Akers, Robert P. Wright, W. K. Dutton, and teacher education representatives Willis Ray, of the Ohio State University, and Earl M. Weber, of Ohio University at Athens.

Friday afternoon's schedule included a session on "Believing in Ourselves." The subject was covered by Dr. Kenneth Perry, chairman, division of the arts, Colorado State College, Greeley, Colo.

Lester Riggle, instructor, Defiance High School, was chairman.

The annual banquet was held at 6:30 p.m., Friday.

Richard O. Knight was chairman of the event.

Dr. E. E. Holt, superintendent of public instruction for the State of Ohio, extended greetings.

Guest speaker was Professor William C. Craig, head of the Speech Department, College of Wooster, and his topic of discussion was "Why We Laugh."

The Saturday morning activities included demonstrations in the field of audio-visual aids for industrial arts, conducted by Dr. Clyde K. Miller, director of division of audio-visual education, State Department of Education, Columbus; also on teaching aids constructed by the industrial-arts department, conducted by Homer Barbe, instructor of industrial arts, Wellington Exempted Village Schools, Wellington; and jigs and fixtures for wrought-iron work, conducted by Robert M. Fricker, chairman, department of industrial arts, Parma Public Schools, Parma, Ohio.

R. S. McAllister, supervisor of industrial arts, Kettering, was chairman.

At the 11:00 a.m. session on Saturday morning, the Ship's Program was held.

Robert S. Deafenbaugh, instructor at Newark, Ohio, High School, and commercial exhibits manager, was chairman.

Harry Masters, L. S. Starrett Co., Athol, Mass., served as captain, and deck officer was Quinton R. Meek, Rockwell Manufacturing Company, Pittsburgh, Pa.

ARIZONA I-A TEACHERS MEET

The first annual spring meeting of the Arizona Industrial Arts Association was held on Friday and Saturday, April 8 and 9, 1960, at Phoenix.

Heard at the Saturday conferences were Dr. Denis J. Kigin, Arizona State University, Tempe, who spoke on "The Nature and Extent of Shop Teacher Liability," and Dr. Kermit Seefeld, chairman, industrial arts department, University of California, Santa Barbara, on the topic (by transcription) from Epsilon Pi Tau Breakfast, California Industrial Education Association Convention, March 1960, "Industrial Education in the Decade of Decision."

(Concluded on page 60)

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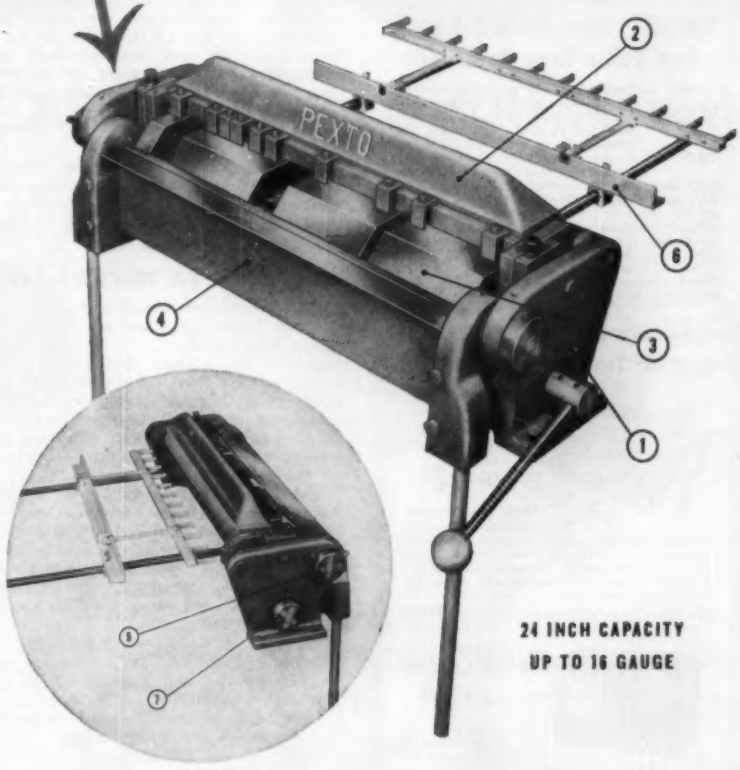

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ASSOCIATION NEWS

(Concluded from page 59)

Included in the program were special demonstrations of new products by manufacturers, and the distribution of door prizes.

ANNUAL STATE CONVENTION

The Washington Industrial Arts Association held its tenth annual state convention at the Hudson Bay High School, Vancouver, Wash., on Friday and Saturday, April 15 and 16.

WIAA is comprised of industrial-arts teachers of the public schools and colleges of the state.

The convention encompassed project displays by students, instructors, and public craftsmen; tours through the vocational facilities at the new Clark College in Vancouver; exhibits and demonstrations by distributors of shop equipment and supplies from throughout the Northwest; and a visual-aids clinic.

Earl Jackson, Vancouver, was general chairman.

State officers of WIAA are Gene Rieger, president; Wayne Chapman, first vice-president; Earl Jackson, second vice-president; Henry Cable, secretary; and Byron Verbon, treasurer.

NEW JERSEY I-A TEACHERS MEET

The forty-second annual convention of the New Jersey Vocational and Arts Education Association held in Asbury Park, March 17–19, stressed "Practical Education For All." This theme was significant at the various meetings and educational exhibits attended by nearly twenty-five hundred members and guests who made the gathering one of the most successful held by the association.

The distinguished speakers at the general and sectional meetings amplified the importance of vocational and arts education in today's curriculum. These speakers repeated the feeling that a school program that decries the emphasis on practical and industrial arts and other so-called special subjects is unbalanced.

The annual closing affair featured the distribution of the Ship's Loot, School Exhibit Awards, and presentation of the new NJVAEA officers.

Leonard J. Skolnick, Newark industrial arts teacher, is the new president.

Other officers elected were: first vice-president Willard Vroom, Trenton graphic arts instructor; second vice-president Dr. Burr D. Coe, Middlesex County Vocational & Technical High School director; third vice-president Rosalie Cavallo, Essex County Technical High School for Girls principal; secretary Richard O. Harthmann, Jersey City IA supervisor, and Edmund A. Boyer, Jr., Merchantville IA instructor.

COMING CONVENTIONS

Apr. 29–30. Western Kansas Industrial Arts Fair, at Fort Hays Kansas State College, Hays, Kans. Corresponding secretary, Herbert D. Zook, Industrial Arts Club, F.H.K.S.T., Hays, Kans.

May 6–7. Connecticut Industrial Arts Association, at Central Connecticut State College, New Britain, Conn. Publicity, Garland W. Reedy, Storrs Heights Rd., Storrs, Conn.

June 13–17. Colorado Vocational Association, at Colorado State University, Fort Collins, Colo. Exhibit Chairman, Herbert L. Benson, Colorado State University, Fort Collins, Colo.

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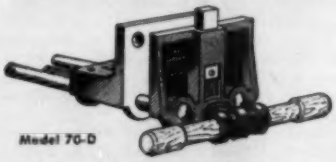

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Integrating Science with Industrial Arts

A space-age industrial arts program, in which students are given an opportunity to apply scientific principles through creative experimentation in the fabrication of projects, has been developed by the Bronx High School of Science in New York City.

The school's first principal, Dr. Morris Meister, now president of the Bronx Community College, realized that his students would never understand, much less appreciate, science unless they could see its direct application. Stereotyped experiments were dropped and freshmen found themselves working on science projects that triggered creative activity and included use of tools, machines, and materials.

Eventually the science teachers were replaced by industrial arts teachers who had the special training and skills to help the students more effectively in this problem-solving method. There also evolved three science shops called the "Science Techniques Laboratories" which were designed to make available facilities whereby the physical concepts in physics could be materialized. In 1956 an industrial arts chairman was appointed and made responsible for the supervision of the industrial arts teachers and their shop laboratories, but this change has in no way affected the type of work offered in the courses.

The program which is now being studied by the New York state education department for the purpose of introducing it on a state-wide scale works like this:

1. Every student is required to make one or more scientific projects of his own choice under the guidance of a laboratory teacher. These projects may be selected from any field of science. They may be of the student's own invention or may be prompted by problems encountered in physics, chemistry, biology, or mathematics. It may be something seen at an exhibit, assembly program, or industrial display.

2. The instructor will encourage his class to look for ideas in books, catalogs, magazines, or reports relating to science. Projects containing dangerous materials are not accepted.

3. The project is carefully planned by the student. He must prepare a drawing, a bill of material, and the probable procedure for completing the project. The cost of the project must be approved by the parent.

4. Upon completion, a special research report must be submitted describing the science principles involved in the construction and use of the project. Student must give source of the project idea and the references used in completing the assignment.[1]

5. The students meet five periods per week — two double work periods and one single period for lessons and demonstrations.

These projects will aid both the teacher and the student in their efforts to participate in the integration of industrial arts and science activities.

Abraham G. Beleson, instructor at the Bronx High School of Science, reporting on the program in the March issue of *Viewpoint*, official organ of the New York State Vocational and Practical Arts Association, says that this project concept "provides unusual opportunities for problem solving. The creative teacher, regardless of his field of interest, looks for ideas to challenge independent thought and work on the part of each student. A student who is encouraged to make the fullest use of all his capabilities will not be satisfied to stop when he has accomplished the minimum essentials. One of the prime functions of this experimental work is to encourage intellectual curiosity and creative expression." ◀

[1]Taking a page from the Bronx experiment, the state education department, in co-operation with the College of Education at Oswego, organized a curriculum workshop to develop project ideas. A monograph was prepared containing such ideas of scientific value as would suit any industrial art shop. (For details see page 14 of your IA/VE for January.)

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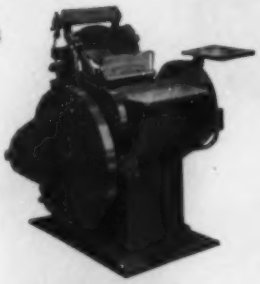

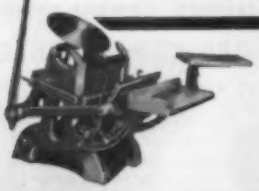

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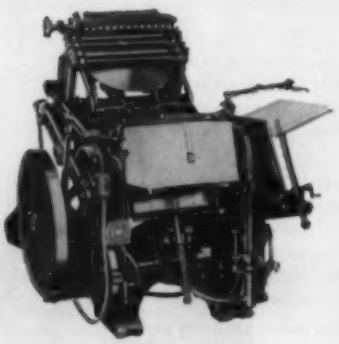

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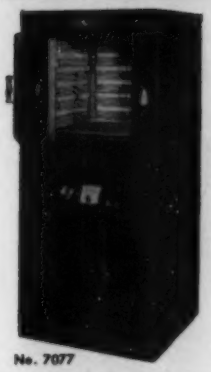

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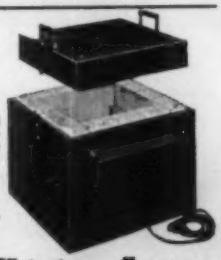

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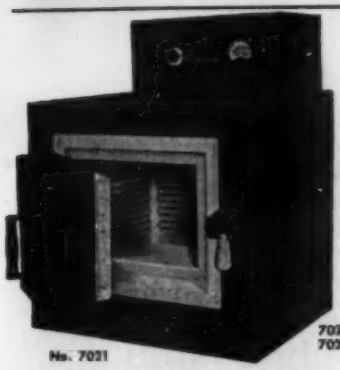

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7032	5½"x 6"x5"	115 V 10 Amp. Price F.O.B. Phila., $45.00
7033	12"x12"x5"	115 V 17 Amp. $85.00
7034	11"x18"x5"	230 V 12 Amp. $135.00

No. 7033

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ELECTRIC CERAMIC KILNS

1. Eye level controls — pilot light. 2. Built-in pyrometer for visible accurate temperature indication. 3. Handles are cool to touch. 4. Control switch — low, medium, and high heat for even distribution. 5. Special insulation holds heat and prevents scorching of table top. 6. Maximum temperature 2050° F.

No. 7004

SPECIFICATIONS

Model No.	Interior Size	Shelves Furnished	Approx. Time	Price F.O.B. Phila.
7006	8"x 8"x 5½"	1	3 hrs.	$ 85.00
7004	8"x 8"x11"	2	4 hrs.	115.00
7005	12"x12"x11"	2	3 hrs.	250.00
7007	15"x15"x16½"	3	4 hrs.	480.00
7009	12"x12"x 5½"	1	4 hrs.	125.00

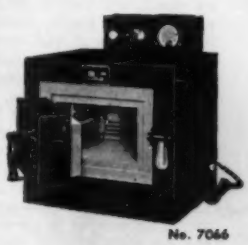
Enameling on copper can be efficiently fired on our models No. 7006 and 7009.

CONTR. TEMP. KILN FOR ENAMELING ON COPPER

These units provide manual adjustment of temperature for kilns. They may be regulated so that the current may be supplied to the kiln for any percentage of time per minute. This method of selection provides exact temperature because the slightest movement of the control knob will vary the time of input, thereby raising or lowering the temperature as desired.

SPECIFICATIONS

Model	Interior Size	Price F.O.B. Phila.
7069	12"x12"x5½"	$179.00
7066	8"x 8"x5½"	137.00



No. 7066

No. 15

ELECTRIC PLASTIHEETER

Designed for use in Plastic Courses in the school — a commercial type of strip heater designed to heat sheets of Plexiglas or Lucite until they become soft and pliable for shaping to the form desired. It is essentially used for straight line bends or folds and is capable of heating sheet material up to ½" thickness in from 30 seconds to 4 minutes depending on the thickness of the contact with the heating element and the platen remains cool, there is no possibility of creating mark-off on the sheet.

SPECIFICATIONS

No.	Working Space	Overall Size	Wattage 115 Volt	Shipping Weight	F.O.B. Phila.
15	18"Lx5"Wx2½"H	21"Lx7"Wx3½"H	200 W	4 lbs.	$22.50
16	30"Lx5"Wx2½"H	32"Lx7"Wx3½"H	350 W	6 lbs.	35.00

THE ELECTRIC Hotpack COMPANY, INC.

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Performance of the Tungsten-Carbide-Coated Saw

Considerable research is going on to solve the technical problems connected with some adaptations of bonded tungsten-carbide particles in the woodworking field. Approximately a dozen manufacturers of tungsten-carbide-coated tools are in the field. The complete answer of quality control and tolerance is still in the experimental stage.

This is a report on the testing of several saw blades of this type.

The test cutting was undertaken to determine the amount of breakdown of the tungsten-carbide particles and to what degree the amount of runout in the blades affected their cutting quality and contributed to their breakdown. Blades with runout of .005, .015, and .025 were used in the test. Following materials were cut: maple, cherry, and poplar wood 1 in. thick (both kiln- and air-dried), ¼-in. hardboard, ¾-in. plywood, and ½-in. drywall.

The cutting was done in a "hogging" fashion. The material was fed through the saw as fast as the machine could cut it. After each 15-minute cutting period a test cut was made in a piece of maple. Approximately 20 board feet of material was cut in the 15-minute period.

Test Results

Results of the tests seemed to indicate:

1. A gradual deterioration of the blade cutting action on all materials, but greater on drywall. However, when the blade would no longer cut maple wood satisfactorily it still performed satisfactorily on drywall and hardboard.
2. Maple caused greatest deterioration of the blades.
3. Performance was poorer in ripping than in crosscutting.
4. No "kickback" was experienced. Added pressure was needed to prevent material from "riding up" on the blade.
5. Heat generated by gum and resin build-up around tungsten-carbide particles can cause change in runout.
6. The cutting performance of the blade with .015 was superior to those of lesser and greater runout.
7. As blades deteriorated additional pressure needed in feeding caused splintering in plywood at the end of the cut. However, there was less splintering on the underside of plywood than with ordinary blades.
8. Small amounts of tungsten-carbide material are removed by the wire brush during cleaning. (Lacquer thinner was found to be good solvent used with the wire brush.)
9. Blade should be properly shielded as centrifugal force throws off tungsten-carbide particles.
10. No cleaning of blade was necessary while cutting hardboard or drywall. Hardboard was found to clean blade of gums and resins.
12. Amount of runout at the outset made no appreciable difference in the width of the saw kerf.
13. Tungsten-carbide saws duplicated smoothness of cut of standard blade with extremely accurate side jointing.
14. Plastics can be cut satisfactorily but greater pressure is needed in holding and feeding.
15. Soft metals such as aluminum can also be cut satisfactorily with tungsten-carbide blades.

OTHO J. QUICK
Acting Head, Department of Industrial Arts
Northern Illinois University, DeKalb

TABLE I

Cutting Test History of Tungsten-Carbide-Coated Saw Blade — Runout .005 In.

Material cut	*Time (min.)*	*Cumulative time (min.)*	*Cleaning*	*Width of kerf (at start — .157)*
Maple	15	15	After 15 min.	.154
Plywood	15	30	After 15 min.	.153
Maple	15	45	After 15 min.	.152
Plywood	15	60	After 15 min.	.150
Drywall	15	75	After 15 min.	.150
Maple	2	77	After 1 min.	.150
Hardboard	15	92	None	.150
Plywood	15	107	After 15 min.	.151
Runout at end — .009 in.				

TABLE II

Cutting Test History of Tungsten-Carbide-Coated Saw Blade — Runout .015 In.

Material cut	*Time (min.)*	*Cumulative time (min.)*	*Cleaning*	*Width of kerf (at start — .156)*
Maple	15	15	After 15 min.	.156
Plywood	15	30	After 15 min.	.156
Maple	15	45	After 15 min.	.156
Poplar	15	60	After 15 min.	.155
Maple	15	75	After 15 min.	.153
Poplar	15	90	After 15 min.	.150
Cherry	15	105	After 15 min.	.149
Runout at end — .015 in.				

TABLE III

Cutting Test History of Tungsten-Carbide-Coated Saw Blade — Runout .025 In.

Material cut	*Time (min.)*	*Cumulative time (min.)*	*Cleaning*	*Width of kerf (at start — .156)*
Maple	15	15	After 15 min.	.156
Plywood	15	30	After 15 min.	.156
Maple	15	45	After 10, 15 min.	.156
Plywood	15	60	After 15 min.	.155
Maple	15	75	After 5, 9, 13, and 15 min.	.155
Hardboard	15	90	None	.154
Plywood	15	105	After 15 min.	.153
Poplar	15	120	After 15 min.	.152
Runout at end — .016 in.				

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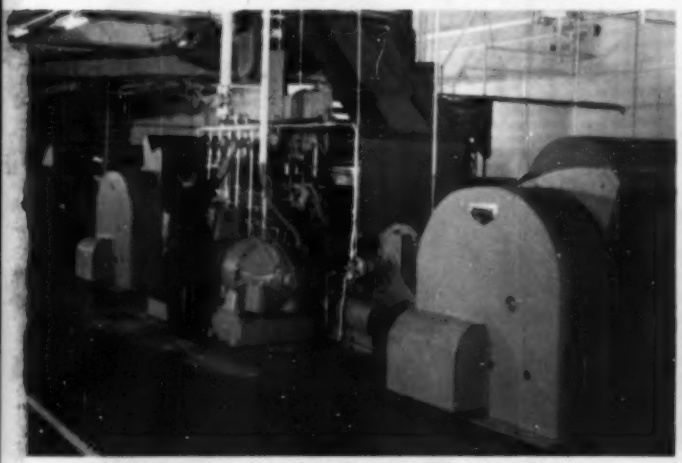

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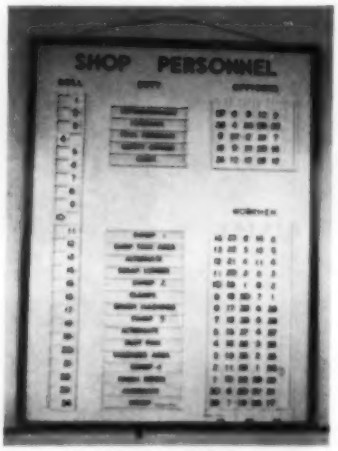

STUDENT OPERATED PERSONNEL BOARD

Many devices have been developed to aid the instructor in a functional shop personnel system, all of which are suitable to a certain extent when carefully executed.

Most instructors have tried many of these, besides developing a few of their own; the one problem usually remaining was of what to do with jobs that have been assigned by numbers when you have fewer students than numbers, or what to do when you have fewer jobs than students.

One method to take care of individual classes was to post a written list on the bulletin board. Here the problems were that students neglected to find out what their job was, or it was too crowded the first day of the assignment so they skipped it and more annoying was the fact you had to copy all of the names over each week.

With these problems in mind, the illustrated board was so developed and thus far has proven to be very satisfactory.

Each student is assigned a number which is the same as his work station. This system works regardless of what kind of shop. For roll call each student calls off his number; if a student is absent the next student calls out the absent student's number and then his own (i.e., "twelve absent, thirteen"). The student clerk then moves the absent student's number to the right, and if necessary records the absent student's name on the class absent list. The alternates do the jobs of the absent students. It is also the duty of the clerk to change the numbers at the end of each week.

The officers are elected and serve

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FOR THE
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daily for one quarter, semester, or year. The workmen serve for one week. Qualifications may be set up for each office if the instructor so desires.

The necessary jobs for each type of shop are printed or lettered on cardboard and slipped into the slots. This way they are easily changed.

Here is a typical shop situation. Assuming we have 20 jobs necessary in the shop and thirty students in class, we have a surplus of ten students. The students whose numbers do not appear on the board are "on vacation"; this serves as an inspiration for the "workmen" if they know they do not have to do a certain job week after week. All officers are elected by the class and serve for a semester with no days off.

In summarizing we might say that this plan handles the following problems presented by some personnel boards:

1. It is large enough to be read from any location throughout the room.
2. Roll call can be taken in one minute or less.
3. It is student operated.
4. Automatically takes into consideration the jobs of absent students.
5. It is permanent, once it is built it is a simple matter to change from one area to the other without constructing a new board.
6. Most important it takes into account different size classes.

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The inserts were placed in a bucket then sprayed with CO_2 from a fire extinguisher. The bucket was then covered for about five minutes. The extremely low temperature resulting from this action shrunk the inserts enough so that they could be fitted into the block easily. When the inserts returned to normal temperature they expanded and made the necessary tight fit.

L. V. Goodney
Roosevelt High School
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SHORT NOTES

- A good strong electric fan properly placed will blow most of the dust and chi way from your face when you are turning on the wood lathe.
- Tinners acid brushes make good glue brushes as they are small enough to fit in wood joints and the bristles do not soften in the glue. They are also very low priced.

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▶ the concluding section of —

Our Automated Industrial Revolution

THOMAS A. HIPPAKA

It is possible that divergent progress through automation can upset the international equilibrium in industrial production. Merely increasing our already immense productive powers and economic superiority for the sake of dumping our products on the world, does not constitute the answer.

As we sell to other nations, we must be willing to buy from them as well, in order to sustain world equilibrium in production and trade. Instability in international, as well as domestic markets, can seriously deter automation, for under such circumstances, investments will not be forthcoming for this extremely expensive process.

The real race in automation may ultimately occur between the more powerful nations of the world. It could even terminate in a life and death struggle between the Communist Bloc on the one hand, and the Democratic Nations on the other.

Because the backward countries provided raw materials in great quantities during the early part of the twentieth century, they can now very well utilize their raw materials more wisely than we employed them, and turn to flooding the world markets with cheaper goods, which will be a product of their efforts in automation. Such a prospect will always constitute a strong argument for highly co-ordinated effort in the field of automation on the part of all Democratic Nations.

Dr. Hippaka is professor of industrial education at Iowa State College at Ames.

When the author was a boy, the community in which he lived literally constituted one's world. If enough people had work in the town, nothing else seemed to matter. Times were good, when people had work which brought them food, clothing and shelter. Life was simple; entertainment, as we demand it to be today did not exist. What concern we developed for the whole of the United States we got out of our school books. Certainly the remainder of the world was of little or no concern to us. Such a state of affairs prevailed for too long a period of time in America, which constitutes one of the reasons why we got into so many difficulties with other peoples of the world.

Accelerated automation in the world's industrial development, may very well constitute a happy circumstance when technological advancements occur at a time when the supply of goods exceeds the demand. In this case inventions, as well as the

(Continued on page 70)

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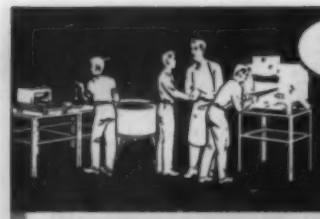

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AUTOMATION

(Continued from page 68)

co-ordinating of essential production components, combine to increase production in a world more ready for it socially, politically and economically. Forward looking people accept automation with a minimum of fear because they realize that the world may be moving from a stagnant economy into a more expansionary one. In fact, without automation, meeting current needs would not be possible.

World War II made it practical politics, as well as realistic peace talk, to advocate the greatest amount of happiness for the largest number of people. The technical assistance of the United States to other countries reflects this spirit. Automation can always come much nearer to satisfying these needs when the conventional methods of production would never have gotten the job done.

Thirteen Reasons

Paul Einzig has given us the following reasons for increasing world production which can come mainly through automated production methods:

"1. All democratic countries have committed themselves, from a greater or less extent, to a Welfare State.

"2. The last few years have witnessed considerable progress towards equality of income, which will probably continue; or, at any rate it is not likely to be reversed to any very large degree.

"3. There is a constant pressure on the economy by ever-increasing wage demands, chasing each other in a vicious spiral.

"4. For the first time in modern economic history an increase of production does not entail the threat of general over-production.

"5. So far from there being a risk of inadequate spending of incomes, a strong trend has developed since the war towards the anticipation of future incomes through the expansion in the use of installment credit.

"6. A drive to increase investment, both public and private, both productive and unproductive, has developed since the war.

"7. Both capital goods and consumer durable goods have become incomparably more involved since pre-war days.

"8. The pre-war formula of 'guns or butter' has been replaced by the formula of 'guns and butter.'

"9. Another reason why increase in production has become a social and political necessity lies in the widespread realization that such an

(Continued on page 72)

Hank Krull, POST Central Division Sales Manager, highlights features of the complete POST school line for Dayton, Ohio dealer, Lee Storck, Gem City Blueprint & Supply Company.

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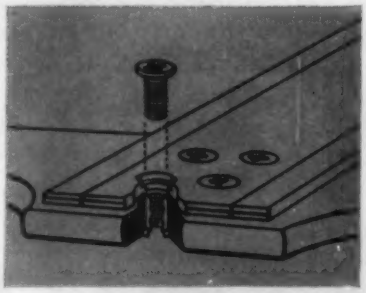

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AUTOMATION

(Continued from page 70)

increase is now technologically practicable.

"10. A number of new materials and manufacturers have made their appearance since the war.

"11. The production of synthetic materials made considerable progress during the war under pressure of necessity.

"12. The world's population continues to expand, and in some backward countries the rate of expansion is likely to increase.

"13. Almost for the first time, the urgency of satisfying the needs of underdeveloped countries has come to be realized in the advanced countries."

Less people need to live under subsistence levels as automation increases production throughout the world. Modern methods of industry, coupled with education, can provide work for millions more. As a result, people in greater numbers can raise their standard of living through honest effort, always preserving their self-respect. Automation, coupled with clearer thinking on the world situation brings these concepts within the realm of practicality.

The upgrading of living conditions of underprivileged people presents many obstacles. Millions have lived in poverty so long that to be depressed is "normal" for them. This state of mind is not easily overcome. These people lack know-how, as well as buildings and equipment. The high birth rate makes sheer numbers of human beings a major problem. There is always the hope that automation can be so accelerated that production may outpace the birth rate widely enough to make some real differences.

Reciprocal Trade

The advanced countries will have to buy more from the have-not nations. They cannot expect to be on the selling end constantly, thereby forgetting that the less fortunate nations must be able to sell too, if they are to remain in existence. Unless the capitalistic nations help the distressed countries by assisting them with know-how, as well as trading with them, communism will impose its cruel will on such peoples.

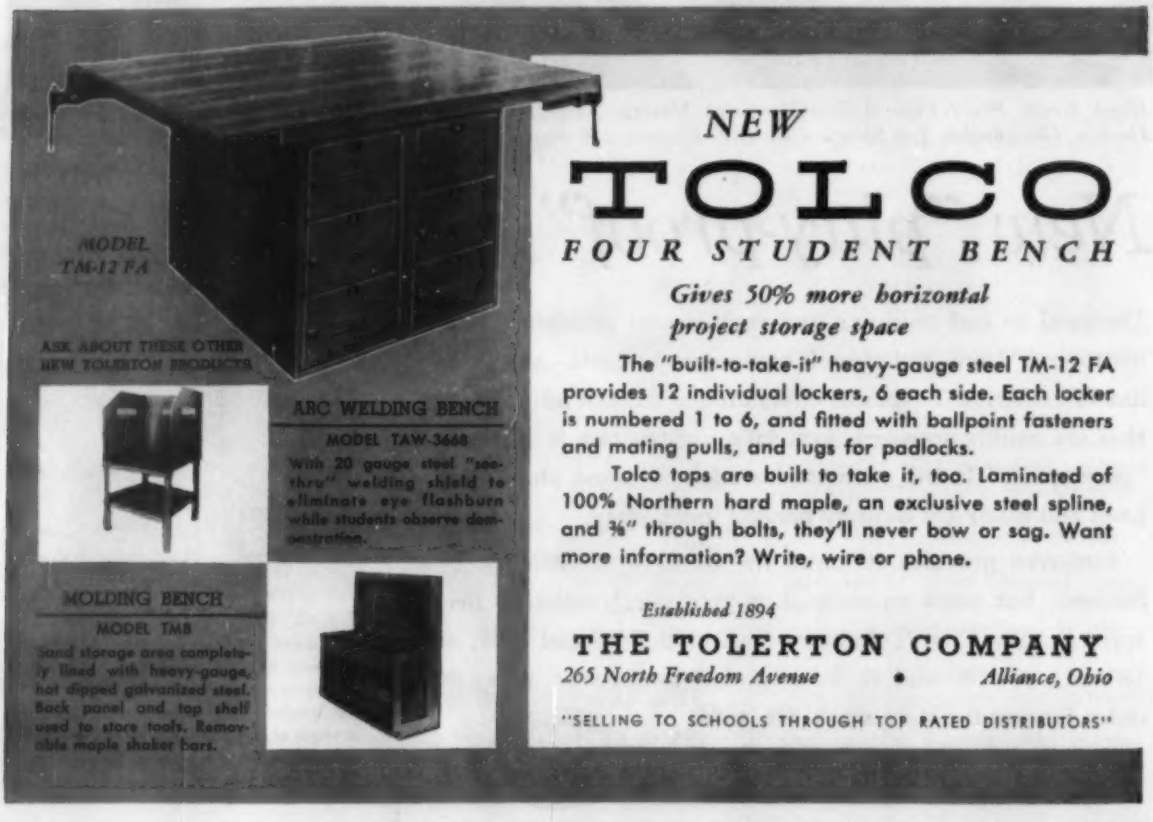
There are those who argue that if the standards of living of the people with high birth rates are sufficiently improved, population increases will diminish substantially. However, other social and religious factors are always present, so this argument may not withstand the test of time.

Those who would deter the full development of automation are short-sighted indeed. Such people not only hinder progress in their own country, but they further complicate the world situation by keeping too many people far below subsistence levels. Through their selfishness they literally promote poverty and starvation, the adjuncts most welcome to communists as they proceed with their dastardly work.

Greedy people not only jeopardize the future of their own countries, but they endanger the very foundations of the democratic way of life wherever it still exists today. The backward countries desperately need our consumer goods, as well as our capital goods. The advanced countries can supply us with raw materials so essential to our welfare. Lack of raw materials can very well become a serious problem in the countries where automation is in full swing.

It is not too fantastic to perceive that underdeveloped countries have certain advantages over those which were compelled to struggle through the periods of pre-automatic industrialization. The former have no obsolete plants or equipment which

(Continued on page 74)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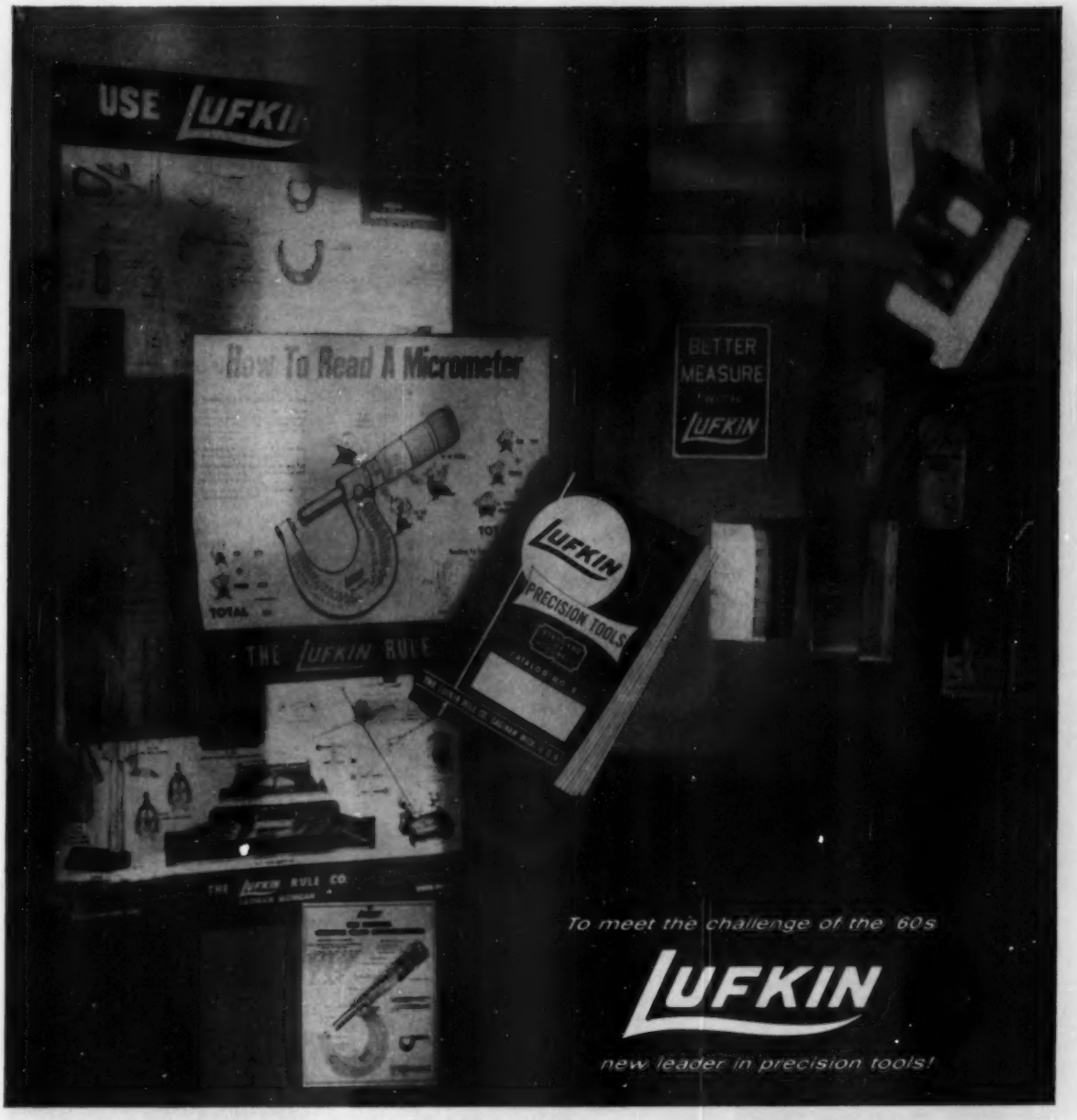

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AUTOMATION

(Continued from page 72)

have to be scrapped before they proceed with automation. They need not progress "the trial and error way" which was the lot of the pioneering countries. The backward countries can benefit by our mistakes, as well as the know-how developed and recorded by advanced countries. They can even surge ahead of older industrial nations, which cannot afford to destroy conventional plants and equipment. This all sounds quite simple until we examine further the problems facing the underdeveloped countries.

The backward countries may not have to scrap outmoded factories, as they contemplate automation, but they face a host of other serious difficulties which can well be insurmountable. Scarcity of capital is an ever present problem. Labor-saving devices are generally installed to lower the cost of production in the face of a labor shortage. Labor is both cheap and plentiful in the backward countries. Unemployment flourishes continuously. Skilled labor is often nonexistent, and automation demands it if it is to succeed.

It naturally follows that automation must be quite complete if it is to be at all effective in the so-called underdeveloped countries. In order to make it worth while, machines must play their intended role.

Incomplete Answer

The introduction of automation is not only difficult in the underprivileged countries, but it leaves much to be desired. It hardly pays to introduce it where unskilled labor is unable to make a decent living, and skilled labor is difficult to train. To import skilled labor would complicate matters without enhancing the purchasing power of the natives. Until there is assurance that the people of a nation can be trained to do skilled work, automation is unthinkable.

Foreign capital has been invested in almost unlimited amounts in the countries of the Middle East. Middle East oil production constitutes a brilliant example of what humanity can do co-operatively to improve the lot of mankind.

If and when the backward countries can install automatic factories, they will not only raise their living standards, but they will strengthen their capacity as world competitors. They could even undersell their foreign rivals, not only at home, but in foreign countries. A country like the United States could relieve itself of the foreign aid burden because more countries would be able to help themselves with greater success. Increased purchasing power makes any nation more capable of carrying its world responsibilities.

The advanced countries would do well to build up their diplomatic relations, as they provide backward countries with technical assistance. Many of our advanced industrial countries face the problem of raw material shortages, as they accelerate their automative process. Nations, backward in industrial production, often hold the key to the resources which the industrial countries must have if they are going to stay in business.

Admittedly, while automation does not constitute the only means of increasing production, it distinctly adds up to progress in a fast moving world. It constitutes the most important means of increasing production, thereby creating a greater demand for more raw materials as it satisfies the ever increasing needs of man. In the long run it increases total employment. With automation, the work week can be shortened, still more, if and whenever this is thought wise.

Obviously, the cost of goods can be lowered, making them available to more people. As automation creates a greater demand for raw materials, it affords more people employment. More new capital equipment will have to be manufactured for new plants, as well as for the replacement of obsolete equipment. Although automation may put some men out of work, these men are only released for labor in other branches of production. While standardization is not only desirable, but at times necessary to make automation pay, it stimulates mass production through mass demand.

Russian Threat

There have been some indications to the effect that as Russia improves her automatic production she is doing everything in her power to impede the further development of automation in other countries. She genuinely fears the potentialities of nations like England and the United States in matters of accelerated production. Russia's bargaining power is weakened on the world scene when other nations forge ahead of her, and nobody knows this any better than the autocrats in the Kremlin. In fact, even reasonable industrial progress in the free countries is of grave concern to the rulers of Russia.

Russia, too, is passing through her kind of industrial revolution, of which automation is apparently an integral part.

(Continued on page 76)

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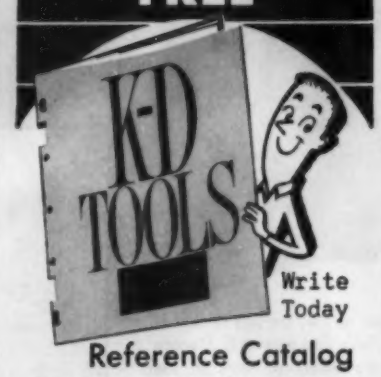

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AUTOMATION

(Continued from page 74)

Nevin Bean, Technical Assistant to the General Manager, Automatic Transmission Division, Ford Motor Company, who toured Russian industrial plants had this to say in 1955: "Within 10 to 15 years Russia expects to replace manual production machinery with automated lines throughout industry, wherever possible."

In contrast to decades of under production of domestic goods in Russia, John Kennedy who visited Russia early in 1958 reported that the Soviets would be exporting consumer goods within five years.

The situation in Japan has some alarming aspects. Raw materials are scarce and markets are difficult to procure. Early in 1958, three million college graduates found themselves without jobs.

Problems arising from automation can frighten peoples and nations into added governmental controls. Whenever such controls are increased, free enterprise, as we know it, suffers a setback. Progress in industrial production is bound to create some hardships, most of them temporary, as the history of world industrial advancement clearly points out. Fear of automation was evidenced at the Eleventh International Management Congress which met in Paris in 1957, when Professor Polak of the Netherlands advocated governmental control of automation "in order to insure reasonable fixed employment and a sound economy."

Competitive, free enterprise has added much to the greatness of the United States. It will always remain a bulwark of strength in America. Our citizenry needs to realize this more than ever before, if we are to preserve our way of life.

Economic Cold War

As we hopefully view automation as a weapon for securing world peace, let us make no mistake about it, the Kremlin is employing the same weapon to gain her goals. She too is spreading industrial know-how throughout the world, supplying peoples with equipment and sending her economic, political, and technical experts to the underprivileged countries. This type of cold war will be of long duration with no holds barred on the part of the Russian rulers. The men in the Kremlin must know as we do that nobody can win a habitable world through a nuclear war, for there will be no world left for anyone to own after the holocaust.

On the other hand, Russia's leaders believe with fanatical fervor that

capitalism can be annihilated through political, economical and industrial means, and that when this has been accomplished there will still remain a world which they intend to have and to hold. It naturally follows that it will take superhuman effort on our part to cope with a wily adversary bent on attaining world conquest through fair means or foul.

Unrosy Realism

Harrison S. Brown paints a very realistic picture of world industrialization in these blunt words:

> Today we are in the middle of an enormous revolution characterized by the rapid spread of industrialization throughout the world. Hand in hand with the growth of industrialization goes the power of waging modern war. Within the last half century we have seen the growth of industrialization and of war-making potential in Japan. We all know what happened as a result.
>
> More recently we have seen the growth of industrialization in the Soviet Union and we see today what is happening as a result. But I would like to stress that the Soviet Union is by no means last on the list, that we are closer to the beginning of this revolution than we are to the end.
>
> China is industrializing and already she is causing trouble. Other areas of the world will follow — India, Africa, the Middle East, South America.

Early in the year 1958, the magazine *Industria* in Sweden reported on a poll conducted in 1957 to ascertain how the people of that country felt toward automation. Nearly one half of the people questioned had seen automation in one form or another.

The introduction to the questionnaire defined automation as "a process for the production of goods and services in which a machine not only makes the product, but also completely or partially controls, supervises, and directs itself."

According to the study, most Swedes are pleased to welcome an automatized economic life. "Nine out of ten wanted to see automation become widespread in Sweden. Nearly five out of ten thought that automation would create more jobs, while less than two feared unemployment. About two-thirds expressed the opinion that automation would result in increased contentment in the places of employment. Several replied that the question of contentment would depend on the type of the place of employment, or the employer, or on the form that automation takes." ◀

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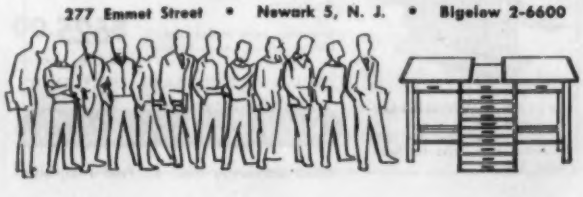

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Assistant Director, Research Division, National Education Association

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(Continued on page 80)

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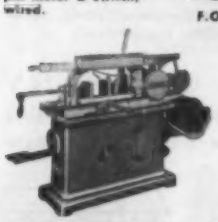

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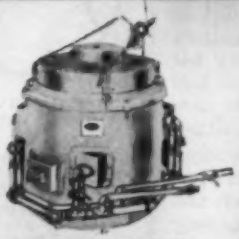

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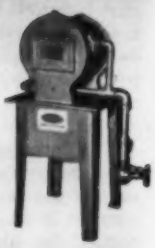

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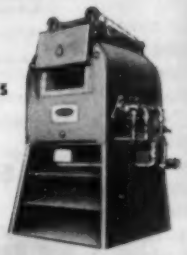

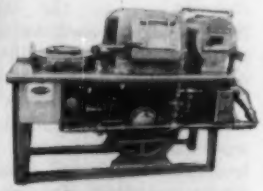

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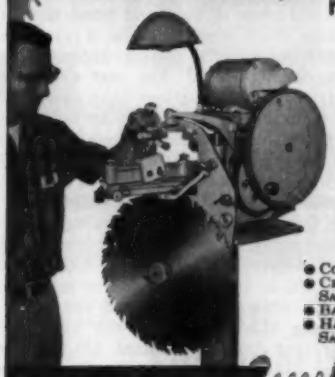

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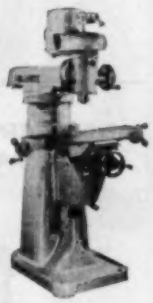

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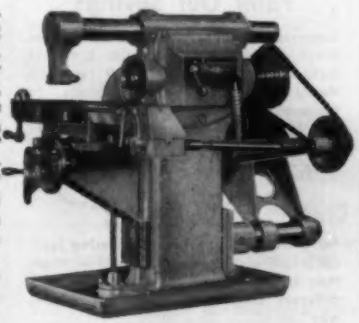

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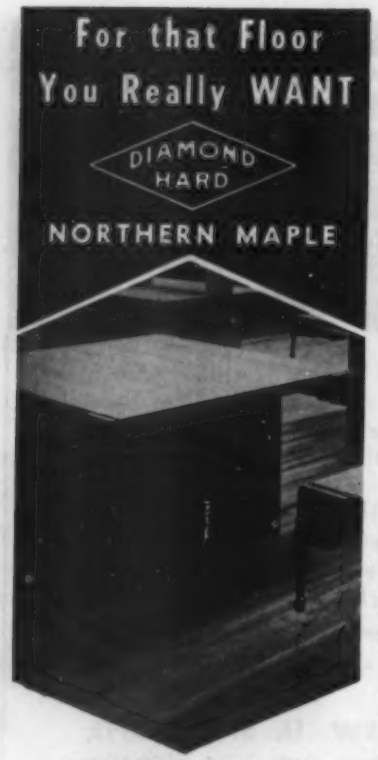

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I-A TEACHERS

(Continued from page 78)

specific parts of the complex problem of balancing teacher supply with demand.

It is clear that substantial — in some cases really amazing — progress has been made in the drive to improve the quality of instruction in classrooms that now number some 1,350,000. This progress has been irregular, both with regard to place, grade level, and subject, and in the face of enormous annual increases in the enrollment. Most significant has been the improvement in the qualifications of the elementary school teacher, historically the one least well prepared. But the qualifications of the nation-wide corps of high school teachers have also been strengthened.

These have come during the years when the most insistent cry was for greater numbers; in the popular view a larger supply of available candidates too often overshadowed the need for demonstrable competence. But now this popular cry for sheer numbers is turning to a clamor for special consideration of the sciences, mathematics, and foreign languages. Teachers in the stable and perhaps less spectacular fields will, however, find their share of both the responsibility and the opportunity to be at a constant level. Certainly the leaders in industrial arts and vocational education will want to take stock of current conditions and prospects for change.

The annual nationwide report made by the research division of the National Education Association provides the basis for a review of past and prediction of future staff needs.[1] Table 1 provides numerous specific facts concerning the decade just closed. The vast swings in total college graduations have particular significance in such fields as industrial arts and home economics because of the changing proportions of men and women in the total group.

Starting with 1950, the year producing the greatest number of college graduates, the number of men receiving bachelors degrees dropped from 330,000 to 183,000 in 1955, a decrease of fully one third, while the number of women receiving this degree did not vary one per cent from a constant 104,000 per year. It was, of course, the diminishing number of veterans that brought about this changing proportion as well as smaller total number of college graduates being poured into the total manpower reservoir. And, equally signifi-

[1]The thirteenth annual national report, entitled "Teacher Supply and Demand in the Public Schools, 1960" is now available through the Publication-Sales Division of the NEA at 75 cents per copy.

(Concluded on page 82)

TABLE 1. TEN-YEAR REVIEW OF THE PRODUCTION OF NEW INDUSTRIAL ARTS TEACHERS BY COLLEGES AND UNIVERSITIES

Year	Total bachelor's degree graduates[a]	Prepared to teach in high school		Prepared to teach industrial arts		Percent entering teaching
		Number	Percent (of column 2)	Number	Percent (of column 3)	
1	2	3	4	5	6	7
1950	433,734	86,890	20.0%	4,890	5.6%	[b]
1951	384,352	73,015	19.0	4,284	5.9	[b]
1952	331,924	61,510	18.5	3,161	5.1	[b]
1953	304,857	54,013	17.7	2,570	4.8	53.3%
1954	292,880	48,916	16.7	2,201	4.5	57.1
1955	287,401	49,697	17.3	2,177	4.4	61.1
1956	311,298	57,785	18.3	2,655	4.7	61.5
1957	340,347	65,062	19.1	3,392	5.2	68.0
1958	365,748	69,093	18.9	3,791	5.5	68.9
1959	387,000[c]	78,220	18.5	3,830	5.4	69.0
1960	401,000[c]	80,465	20.0[d]	3,985	5.0	

[a] As reported by U. S. Office of Education.
[b] Data not available.
[c] As estimated by U. S. Office of Education.
[d] Based on estimate of total graduates.

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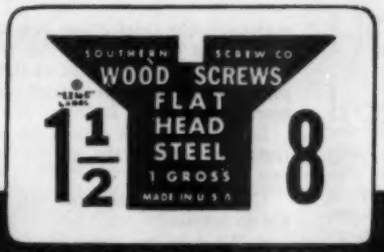

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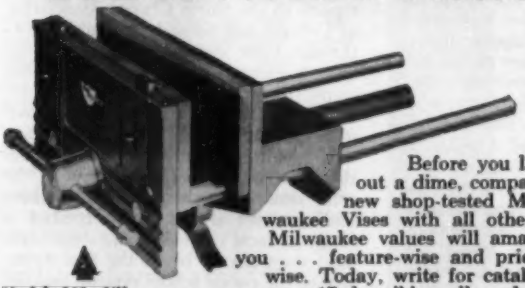

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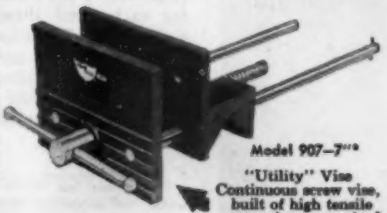

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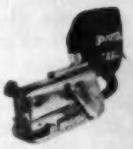

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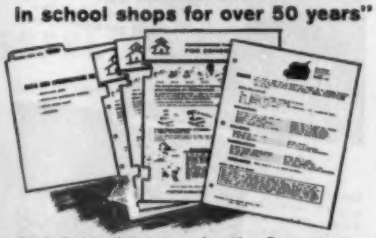

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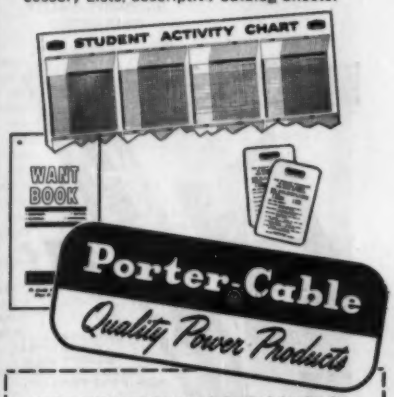

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I-A TEACHERS

(Concluded from page 80)

cant, these five years — 1950 to 1955 — marked the dramatic upswing in the demand for educated personnel by business, industry, and government, as well as the schools. Small wonder that a teaching field depending entirely upon men with a college education, such as industrial arts, should be hard hit!

The figures presented in Table 1 merit careful study because they show accurately the impact of this five-year change upon the supply of new college graduates prepared to teach industrial arts. Column 2 shows the year-by-year drop in total graduates (which, we remember, was in men only). And in 1950, when 330,000 men were graduated, 20 per cent (column 4) of all graduates were prepared for teaching some high school subject. But in 1955, when only 183,000 men were graduated, only 17.3 per cent of all graduates were prepared for teaching.

Now let us examine the table for more specific details. In 1950 as many as 4890 men (column 5) emerged from college with majors in industrial arts and the professional requirements for the teaching certificate. This was 5.6 per cent (column 6) of the 86,890 (column 3) who were prepared for high school teaching. But in 1955 (column 5) the number of men graduates prepared in industrial arts had fallen 55.5 per cent, to a low of only 2177. And this represented only 4.4 per cent (column 6) of the 49,697 graduates at the disposal of the high schools for new teachers of all subjects.

But during this five-year period the research division had started, through its annual nationwide study, to find out just what happened, occupationally, to all college graduates who met the requirements to become teachers in the public schools. The question was raised, "What do these new supply figures really mean, i.e., how many of the college graduates follow through with their original intentions and how many go into other occupations? The first report concerned members of the Class of 1953. Of those graduates majoring in industrial arts only 53.3 per cent (column 7) actually took teaching positions. The next year it was 57.1 per cent, and in 1955 — the year of the lowest production — only 61.1 per cent entered teaching. It was found that the other four of every ten entered other gainful occupations, continued in formal study, went into military service, or were otherwise occupied.

Thus the years 1954 and 1955 stand out as a low point in the flow of newly prepared men coming from the colleges with major preparation in industrial arts and actually becoming teachers of this subject. Since that time (*a*) the total number of college graduates in one year has increased some 100,000, (*b*) the proportion of all graduates prepared for high school teaching has increased from 16.3 per cent to an estimated 20 per cent, (*c*) the per cent of industrial arts majors in the total group prepared for high school teaching has risen from 4.5 to 5, and (*d*) the per cent of this newly produced group who actually go into teaching has come up from 57.1 to 69.

But these figures cannot be fully interpreted without the answer to these two questions:

1. How many industrial arts teachers are in service?

2. What is the turnover, or dropout rate?

A sampling study by the research division in 1955–56 showed that approximately 6.3 per cent of the total high school staff was in the industrial arts field. With the total in 1959–60 being about 511,000, the current number of teaching positions would be about 32,200. Recent annual losses from the total public school staff have been estimated at approximately 8 per cent. This would seem to indicate a close approach to balance between supply and demand in 1959: The loss would have been in the order of 2600, and 69 per cent of the new "supply" of 3830 would be close to that figure. This calculation does not take into account either (*a*) the annual increase in enrollment, or (*b*) the need for an expanded program of service in the field. It seems clear, however, that developments during the second half of the decade just closed have gone far toward checking, and perhaps correcting the critical conditions existing in 1955, the climax of a five-year downturn.

Perhaps this word of caution is in order. The writer of this article has had the major responsibility during the past dozen years of organizing and conducting the annual national study of teacher supply and demand, and of writing the annual report. While some interpretation of the annual findings has been offered from year to year, the temptation to predict future happenings has been restrained.[2] Similarly, in his annual reports to the North Central Association of Colleges and Secondary Schools, 1943 through 1949, only the current findings were presented. But each report has emphasized these facts: (1) *A teacher shortage is always in a specific location in a specific teaching assignment;* Thus (2) a national study can do no more than present a *general overview* of the total situation — the meaning of these findings must always be interpreted in terms of local conditions; (3) the spotlight must always be on the first objective of the public school system, namely, to provide a fair educational opportunity for each pupil throughout each grade and in each field of study.

And since this last point is yet only an ideal, rather than an accomplished fact, the shortage of competent teachers continues as an obstruction across the road of progress.

[2]The writer has offered a projection of future needs for competent instructional personnel in universities, colleges, and junior colleges as a part of the study of that problem organized under his direction six years ago. The most recent of his biennial reports was issued in June, 1959, under the title "Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1957–58 and 1958–59."

SUMMER SCHOOLS

(Continued from page 50)

Rhode Island

University of Rhode Island, Kingston
July 5 to August 12; g; professional; write Nelson Marshall, dean.

South Dakota

Northern State Teachers College, Aberdeen
First term, June 6 to July 8; second term, July 11 to August 12; g and ug; drawing, wood, power, handicrafts, electricity, professional; write W. J. Jerde, dean.

Southern State Teachers College, Springfield
Ug; welding, drawing, wood, metal, auto mechanics, handicrafts, electricity, professional; write W. J. Vorreyer, dean.

Tennessee

Middle Tennessee State College, Murfreesboro
G and ug; wood, machine, drafting, metals, crafts, electricity, professional; write E. S. Voorhies, head, industrial arts department.

Tennessee A & I State University, Nashville
Drawing, graphic arts, professional; write L. C. Farbes, industrial education department.

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Texas

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North State Texas College, Denton
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(Concluded on page 84)

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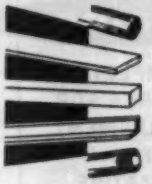

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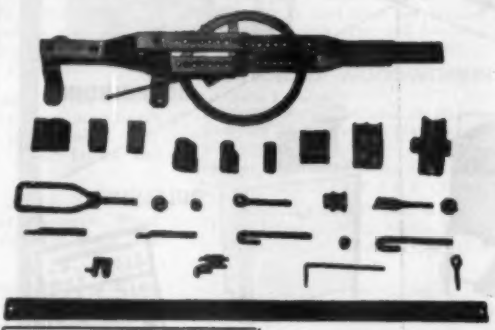

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Tarleton State College, Stephenville
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Texas A. & M. College, College Station
First term, June 6 to July 15; second term, July 18 to August 26; g and ug; professional; write to registrar or dean.

Texarkana College, Texarkana
First term, June 6 to July 15; second term, July 18 to August 26; night session, June 6 to July 30; ug; write W. P. Akin, dean.

Utah

Utah State University, Logan
First term, June 13 to July 15; second term, July 18 to August 19; g and ug; electronics, professional; write registrar.

Brigham Young University, Provo
First term, June 13 to July 15; second term, July 18 to August 19; ug; woods, metals, welding, machine practice, cabinet making, plastics, drafting; write Guy Pierce, chairman, department of industrial education.

Virginia

Virginia Polytechnic Institute, Blacksburg
June 16 to July 23 — industrial arts education; June 16 to 29 — industrial education; g and ug; professional; write J. A. Schad or J. S. Carpenter.

Washington

Eastern Washington College of Education, Cheney
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University of Washington, Seattle
Full term, June 20 to August 19; first term, June 20 to July 20; g and ug; related professional; write registrar.

Walla Walla College, College Place
June 13 to August 20; ug; woods; write director.

Washington State University, Pullman
June 13 to 24, materials and finishes; June 27 to July 8, design; July 11 to July 22, professional; July 25 to August 5, professional; g; write William A. Bakamis.

Western Washington College of Education, Bellingham
June 20 to July 29; June 20 to August 19; July 29 to August 19; g and ug; woods, metals, electricity, graphic arts, jewelry lapidary, power mechanics, professional.

Wisconsin

Stout State College, Menomonie
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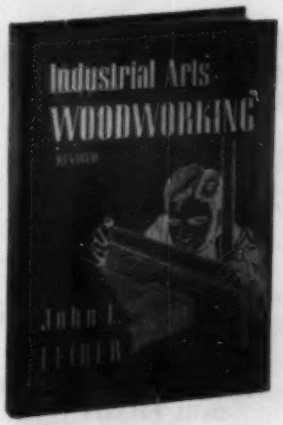

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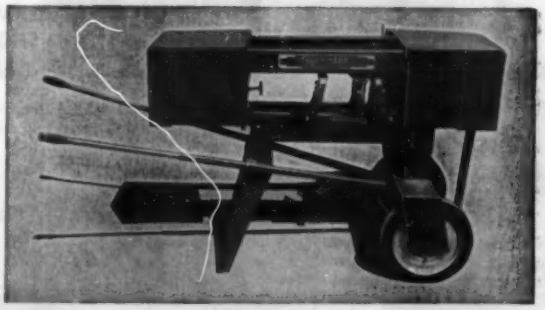

Here's the popular Kalamazoo Model 610 metal-cutting band saw on the handiest chassis you ever saw. Provides greatly increased portability with its rubber-tired 12-inch wheels and telescoping handles. One man shifts the 610 from job to job with ease. Capacity 6" Rounds—10" Flat.

610-D without coolant attachment.
610-W with coolant attachment.
Kalamobile chassis M6A fits all 610 models.

MACHINE TOOL DIVISION

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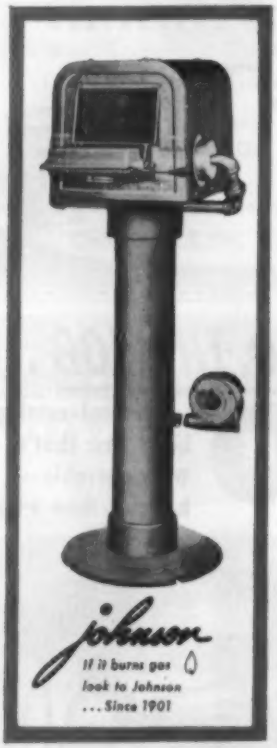
No. 120 furnace heats to 1500° in 5 minutes . . . saves time in the shop



No long waiting for warm up when you instruct heat treating with a powerful Johnson No. 120 Hi-Speed Furnace. Heats 2300° in 30 minutes, temperature easily adjusted for carbon and high speed steels, tools, dies, and small metal parts. Economical operation with natural, mixed, artificial or bottled gas. Complete with Carbofrax hearth, G.E. Motor and Johnson Blower. Firebox 5" by 7¾" by 13½". 120,000 BTUs per hour maximum. **$198.00 F.O.B. Factory.**

Write for FREE JOHNSON CATALOG plus information on factory reconditioning your present Johnson Furnaces.

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BOICE-CRANE TABLE SAWS

Greatly enlarged ripping capacity is featured in two new 10-in. table saws which have just been added to the Boice-Crane line of Monomaster saws. The fence-to-blade capacity of 49 in. is sufficient to split 8-ft. plywood panels crosswise.

The 10-in. Monomaster Table Saw

A feature of the ripping fence construction permits such panel sawing without the need of extension tables, although they are available if desired.

Motors up to 3 h.p. have been added, thus stepping up the capacity of all models of the Monomaster. Similar 3-h.p. motors also are now made available on Boice-Crane spindle shapers and 12 by 4-in. planers.

Literature on all power tools may be had by requesting it.

(For further details encircle index code 0501)

NEW C CLAMP FOR SCHOOL SHOP USE

The Wilton Tool Manufacturing Company, Inc., have introduced their new Series "200" line of C clamps for use in school shops and by home craftsmen.

Wilton C Clamp

The five different-sized units in the new "200" Series are recommended for use in both metalworking and woodworking shops. The new series is also ideal for service and maintenance mechanics.

Equipped with Wilton Perma-Pad, the clamp swivel guaranteed never to come off, the Series "200" frames are made of high-grade malleable iron and clamp screws have precision-cut modified Acme thread.

Maximum capacities of the five sizes in the series range from 3 in. to 10 in., with standard throat depth range from 1⅞ in. to 3⅝ in. Minimum proof test ranges from 2000 to 4000 lb.

For further information on the new Series "200" C clamps, write to the Wilton Tool Manufacturing Co., Inc.

(For further details encircle index code 0502)

NEW FEATURE ON SOUTH BEND DRILL PRESSES

Spindle deflection resulting from depth-gauge pressure is a common cause of inaccuracies in 12- to 18-in. drill presses. The manufacturers of South Bend 14-in. Precision Drill Presses report that this has been overcome by their newly developed Rack Type Depth Gauge.

South Bend Drill Press featuring New Rack Type Depth Gauge

This new feature of South Bend Drill Presses controls the linear travel of the quill by limiting the angular rotation of the quill feed shaft. No depth-gauge collar is used on the quill. The pressure on the depth-gauge nut cannot exert lateral pressure on the spindle as is the case when a depth-gauge collar is used.

The new design also permits closer control of drilling depths as the depth-gauge nut is graduated in 100 divisions, each representing .001 in. of travel. The tension on the quill feed is adjustable, and can be completely released when extreme feed sensitivity is required on exacting work by means of an adjustable friction shoe.

Complete information on these drill presses can be obtained by writing to South Bend Lathe, Inc.

(For further details encircle index code 0503)

NEW KNIGHT STEREO TAPE RECORDER

Allied Radio Corporation announces the release of the new Knight Model KN-4060 Deluxe Stereo Tape Recorder. This recorder combines versatility and simplicity of operation with excellent fidelity characteristics.

(Continued on page 88)

FREE TECHNICAL TEXT

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Hundreds of schools and colleges use Universal drafting machines daily. Write today for free Instructors' Manual. Please include school name and address.

Charles H. Mase, Instructor of Engineering and Architectural Drawing, Alpena Community College, Alpena, Mich. Universal Desk-Topper drafting machines installed by The Eugene Dietzgen Co., Detroit.

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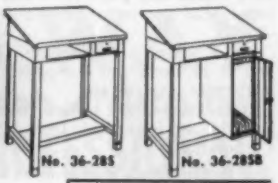

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(For more information from advertisers, use the postcard on page 99)

SHOP EQUIPMENT NEWS

(Continued from page 86)

New Knight Model KN-4060 Deluxe Stereo Tape Recorder

A 3-speed recorder equipped with built-in preamplifiers, the KN-4060 records and plays both 2- and 4-track stereo tapes. Designed for use with external speakers and amplifiers, it may be added to any home stereo high-fidelity system. It can be used for making stereo recordings of "live" entertainment, of stereo disks, or of stereo FM multiplex broadcasts.

Pushbuttons control every function. Fast forward and pause buttons are provided in addition to all standard functions. It provides up to 16 hours of recording time on one 7-in. reel, 4-track at 1⅞ ips monophonic.

Also included is a digital counter for easy "pin-pointing" of any specific portion of a recording — a useful aid to editing.

At 7½ ips, response is 50-15,000 cps for both record and play. Wow and flutter is below 0.25 per cent; signal-noise ratio is -45 db.

The KN-4060 is 8½ in. high, 17 in. wide, and 13 in. deep, and is supplied in a gray leatherette covered case.

It is listed under Allied Stock No. 92 RU 774, and is available from Allied Radio Corporation.

(For further details encircle index code 0504)

TYPE 2300 THERMOLYNE HOT PLATE

Thermo Electric Manufacturing Company announces a new round hot plate featuring a small size (3½-in. diameter top) and precision control from 6 deg. C above ambient to 370 deg. C. (700 deg. F.). Type 2300 Thermolyne Hot Plate is especially recommended for those lab and shop applications where a small single or multiple precision heat source is needed.

Type 2300 incorporates a thermostatic control unit developed by the manufacturer and proven throughout years of use in other of their products. Stepless selection of temperature throughout the entire range is provided. A built-in anticipatory sensing device results in negligible overshoot in initial heat-up, and temperature variation thereafter falls within plus/minus 3 deg. C. There is automatic compensation for wide fluctuation in voltage and ambient temperature to maintain a uniform watt-hour input with consequent even temperatures. From a cold start, the plate reaches 370 deg. C. in less than nine minutes and reserve power at that point is a substantial 46 per cent.

Type 2300 Thermolyne Hot Plate

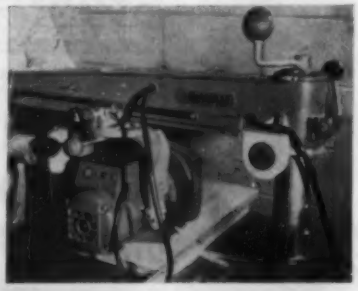
Construction features are aimed at reliable performance and long life. The high-quality nickel chromium heating element is embedded in a refractory plate of new high-purity refractory material. The cast-aluminum top plate is smooth and will not warp or buckle. Good ventilation results from the perforated control housing, heat-reflecting baffles, and ample air space. Yet heat is focused on the reacting thermostat for quick, sensitive response to changes in heat demand.

Literature and information are available on request.

(For further details encircle index code 0505)

AMF DeWALT NEW SAFETY RETURN DEVICE

DeWalt Division of American Machine and Foundry Company, originator of radial-arm power tools for home, farm, school, and industry, has introduced a new safety return device, offering increased protection to the user of DeWalt's Power Shop Model 925, designed for the home workshop.



DeWalt's Power Shop Model 925

Known as the SAF-T-BAK, the new device automatically returns the motor carriage, from which the saw blade is suspended on a radial-arm power tool. The spring-actuated unit greatly increases operator protection from moving parts by safely returning the cutting mechanism to a rear idle position in back of the guide fence the instant the operator relaxes his forward pull on the motor carriage.

The SAF-T-BAK is a self-contained unit designed for quick mounting by using an existing hole at the rear of the radial arm, where the electrical cable is clamped securely in place.

A special spring arrangement and cable-retrieving reel permits a long cable pay-out without excessive build-up. A hook on the end of the cable merely attaches to the rip lock of the motor carriage to assure positive return.

Further information can be obtained by writing to Dept. M, AMF DeWalt.

(For further details encircle index code 0506)

SKIL BELT SANDER

Dust-free sanding is a major benefit of the new Model 445 Skil 4-in. Belt Sander, according to the manufacturer. Vacuum dust pickup attachment is said to be 90 per cent efficient when sanding resins, lead,

Skil Belt Sander

or wood, allowing sanding and painting in the same general area.

Belts reportedly sand faster and last longer because clogging is minimized. Contour sanding is easier, better because of exclusive soft sponge-rubber pad. Full 4-in. belt has 20 per cent more sanding surface than ordinary 3-in. dustless sanders, yet the Model 445 weighs 20 per cent less. Design allows flush sanding up to vertical surfaces. Gearless transmission never needs lubricating.

Write to Skil Corporation for further detail.

(For further details encircle index code 0507)

NEW SLICING AND DICING MACHINE

Brown & Sharpe Mfg. Company have introduced their new 618 Micromaster® Slicing and Dicing Machine, which automatically wafers semiconductor materials such as germanium, silicon, quartz crystals, etc., with parallel accuracy to one ten-thousandth of an inch and consistently repeats in size to plus or minus two ten-thousandths.

Utilizing a metal-bonded or resenoid-bonded diamond wheel, this easy-set-up machine produces clean, "burn-free" wafers. Table driving mechanism provides smooth feed, infinitely adjustable from 0.100 in. to 144 in. per minute with rapid table positioning adjustable to approximately 25 ft. per minute.

The table is mounted directly on the fixed bed in generous V and flat ways to eliminate table twist at transverse index.

The Micromaster Slicing and Dicing Machine

A rugged cast-iron upright moves transversely in V and flat ways on the bed casting. Cross-feed is actuated automatically at the beginning of each cycle by a hydraulic-mechanical arrangement, accurate at plus or minus two ten-thousandths and adjustable from 0 to 0.1000 in. Total amount of index is read directly from the handwheel graduated in increments of 0.00025 in., and is adjustable independent of the handwheel to facilitate setup.

With the addition of a wheel sleeve and by ganging wheels, wafers can be diced in quantity with one pass of the table. Where only dicing is required, machines are available without automatic cross-feed and indexing mechanism.

For more details write for Bulletin "618 Micromaster Slicing and Dicing Machine."

(For further details encircle index code 0508)

Model No. AHVR-300

NEW MODELS OF AIR HEATER VENTURI REGISTER BURNERS

Offering input capacities ranging from 200,000 to one million BTU's per hour, a newly developed line of four "Buzzer" models of Air Heater Venturi Register Burners, AHVR Series, is being introduced to the industrial gas-fired equipment market by Charles A. Hones, Inc. Illustrated is Model No. AHVR-300 with 500,000-BTU input.

Used in wide ranges of suction applications, any typical use of the burners with .25-in. constant suction on the retraining port nozzle provides double the BTU inputs of the standard register burners. The compact register is only 3 in. thick and consists of an adjustable secondary air shutter with the plate equipped for flame rod and pilot mounting. These burners, requiring no blower or other auxiliary power, can also be supplied with a special cast-iron box for easy adaptation to brick-wall setting when required.

Installation and maintenance are simplified by elimination of refractory burner block, which other burners require for flame retention.

Detailed catalog sheet with performance data is available on request.

(For further details encircle index code 0509)

NEW COMPACT "SHORTY" DRILL

Black & Decker Manufacturing Company have added to their line of electric tools a new version of their long-popular "Shorty" Drill, which incorporates a 60 per cent increase in power and a 15 per cent reduction in weight.

This new ¼-in. tool incorporates several new design features. One of the most important is an offset design of the chuck head which facilitates working in confined space and around corners and permits finger clearance on flush drilling jobs. This allows maximum operator control and pressure.

The new "Shorty" is equipped with a full-length paddle switch which enables the operator to maintain positive start-and-stop control in any gripping position. Another feature is twin-fan cooling which assures lower housing temperatures on hand-held surfaces. Air for cooling is drawn in through baffles under the operator's hand.

Specifications on the new drill list its capacity as up to ¼ in. in steel or ½ in. in hardwood. Its speed under full load is 1000 r.p.m. It is equipped with B & D-built universal motor for 115 or 220 volts, but can be ordered for 125 or 240 volts. The drill also can be especially ordered with a toggle switch instead of the full-length paddle.

Additional information available.

(For further details encircle index code 0510)

THE MERIT MIGHT MIDGET SPOT WELDER

A completely new portable spot welder designed and engineered for today's production demands, and equipped with a trouble-free electronic timer and contactor especially designed to assure consistent welds, has been introduced by The Merit Company.

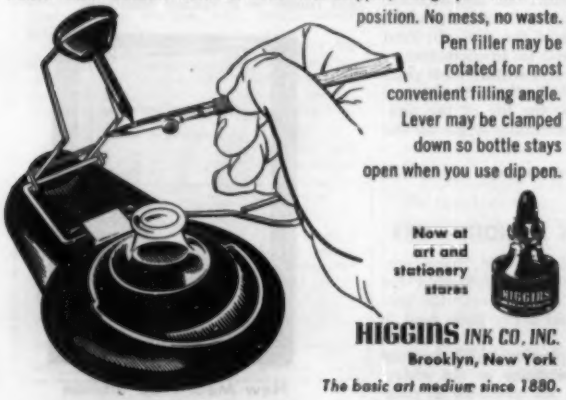
This portable spot welder is water or air cooled, and will weld up to a combined thickness of 5/16 in. The tip pressure varies from 0 to 1000 lb. by means of a simple linkage device.

(Continued on next page)

FILL RULING PENS FAST WITH ONE HAND!

with new HIGGINS INK-A-MATIC drawing ink dispenser

Just a slight movement of your hand, and HIGGINS new drawing ink dispenser fills ruling pens automatically—faster, easier, than ever before! **SPEEDS UP INK TRACING BY 32%.** Ink bottle sits securely on non-skid rubber base. Gentlest touch on lever lifts stopper, brings pen filler into position. No mess, no waste. Pen filler may be rotated for most convenient filling angle. Lever may be clamped down so bottle stays open when you use dip pen.



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to give your students' projects that PROFESSIONAL LOOK!

For the first time, Wilkenson offers its beautifully slim, strong, tapered metal legs to school woodworking shops. These are the very same legs that leading furniture manufacturers have been using for their finest furniture! (Unfinished natural hardwood legs are also available.)

You can readily understand, therefore, why they will give your students' tables, hi-fi cabinets, bureaus, etc., the striking appearance of professional styling plus lasting service.

Complete kits hold four legs, tapered or square, in sizes from 3" to 28", in Satin Brass, Pewter or Coppertone finishes guaranteed not to tarnish, chip or corrode; 16 wood screws; 4 dual-purpose mounting brackets that permit straight or slanted positioning of legs in just a few minutes.

Prices for complete kits range from a low $5.80 for the 3" Tapered Metal Leg Kit to $10.70 for the 28" Leg Kit. (Hardwood Leg Kits start at $4.25.)

FREE SAMPLE KIT

WRITE TODAY for catalog, prices and your free sample kit which has a hardwood leg and 3 metal legs in our 3 regular finishes. Makes it easy for your students to order the legs and finish they want. (Special educational discounts.)

WILKENSON MFG. CO.
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students with a load to carry...

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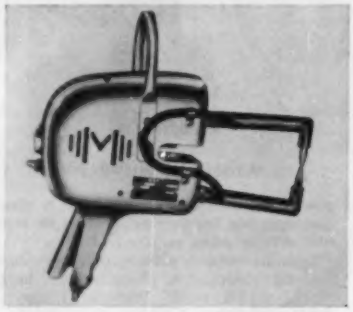
SHOP EQUIPMENT NEWS

(Continued from previous page)

An extremely accurate timer and contactor are part of the package. Model 155 draws 60 amps., at 240 volts. It has an extremely high output of over 10 KVA.

Standard arms on Model B-155 water cooled are adapted to a No. 1 Morse taper



Merit Portable Spot Welder

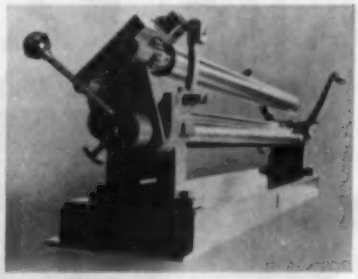
which enables a versatility of standard tip usage. Special arms can be supplied with a submission of blueprints or specifications of the job desired.

Please write for further information.

(For further details encircle index code 0511)

SLIP ROLLS FEATURE CAM LIFT

Berkroy Products Company, manufacturers of metalworking tools, have introduced a complete line of slip rolls in five sizes — 12, 18, 24, 30, and 36 in.



New Berkroy Slip Rolls feature Cam Lift

The new Berkroy Slip Rolls feature a cam lift for quick removal of material; finger-tip controls permit fast and accurate adjustment for any material thickness within the capacity range of the slip roll. Feed and forming rolls are 2 in. in diameter.

Berkroy Slip Rolls also feature steel gears and oilite bearings which eliminate the need for lubrication during the life of the unit.

For complete information write to the manufacturer.

(For further details encircle index code 0512)

VAPOR ACTION CONDITIONERS

Wisconsin Laboratories, Inc., have prepared an important new application for their Vapor Action Conditioners — the protection of brushes and spray guns used in Epoxies.

Epoxies are new plastics which promise important new possibilities in the industrial-arts field. They are available as coatings which have outstanding resistance to chemicals and solvents, and they can be cast into molds and used as adhesives with unusual strength.

Wisconsin Laboratories formulates its own Epoxies for the manufacture of Vapor Action Conditioners. As a result of this experience and extensive experience with solvents, the company has been able to adapt Vapor Action to the protection of brushes used in Epoxies. Protexem Vapor Action comes from the evaporation of solvents from wicks. The dissolving power of vapors is much greater than that of liquids. Vapor Action is employed in Protexem. There are no chlorinated solvents used in Protexem and no benzene.

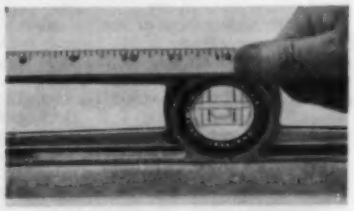
Brushes and spray guns used in Epoxies can be protected by the same Vapor Action which keeps ordinary coatings and finishing materials soft in brushes.

For further information on this product write to the manufacturer for their special bulletin on this subject.

(For further details encircle index code 0513)

NEW ALUMINUM LEVELS

The Columbian Vise & Mfg. Company announce their new aluminum levels with 24-in. rules along the top edge.



New Aluminum Levels

Available in both 4-vial and 6-vial types, levels have full size, die cast frames. They can be read from either edge. Metallic-sealed vials are of solid-set cats-eye design, with plastic rings. They are protected on both sides by heavy glass lenses.

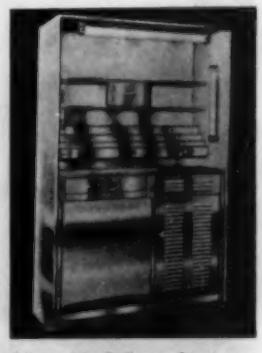
Four-vial No. 4524 level has 2 plumbs and 2 levels. Six-vial No. 6524 has 4 plumbs and 2 levels. Each is 1 in. wide, 2⅛ in. high, 24 in. long, and weighs 1½ lb.

For details write The Columbian Vise & Mfg. Company.

(For further details encircle index code 0514)

ONE-STOP MEDICINE STATION

General Scientific Equipment Company has announced the availability of the Medi-Prep Station for installation in first-aid rooms of industrial plants.



New Medi-Prep Station

METALCRAFTING
PROJECTS
Especially Suitable for VOCATIONAL EDUCATION

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- FOIL EMBOSSING

Looking for something new and different to offer your students this year? Introduce them to the art of metalcrafting.

With just a few simple directions even your most inexperienced students find it surprisingly easy to make beautiful trays, coasters, wall plaques, bracelets, and many other fascinating items.

The only basic materials needed are Craft Metals Corporation's sparkling Mirror-Finish Aluminum, or luxurious looking aluminum COLORCIRCLES . . . Craft Metals Corporation's Safe-T-Etch, non-acid etching compound . . . and Craft Metals Corporation's Hi-Temp Craft Black asphaltum paint.

CMC Aluminum Craft Circles are of the finest quality obtainable.

CMC Safe-T-Etch is the safer, faster etching compound which removes all of the objectionable features in acid etching.

CMC Hi-Temp Craft Black is the free-flowing, quick-drying, asphaltum paint that helps achieve cleaner, sharper etched lines in craft designs.

Craft Metals Corporation also has aluminum and copper embossing foils and tooling metals, and many other craft materials.

For additional information, send for descriptive literature and price list, today. No obligation, of course. Just tear out and fill in the coupon shown below. Your request will get prompt attention.

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Widely used and specified for the country's leading hospitals, the Medi-Prep is particularly suited for the small or large industrial plant.

This easy-to-clean, stainless-steel unit is available either 48 in. wide by 20 in. deep by 80 in. high, or 60 in. wide by 20 in. deep by 80 in. high. It embodies a 4-cubic foot refrigerator, sink, water faucet, work counter, easy-to-see tiered shelves, double-lock narcotic cabinet, and many other features that have proved to save time in the storing, preparing, and dispensing of medications.

This compact design saves floor space, yet provides the necessary room for administering medical care to workers.

Additional information and catalog No. 35 may be obtained by writing to the manufacturer.

(For further details encircle index code 0515)

NEW KODAK 8MM. SOUND PROJECTOR

Eastman Kodak Company have announced a new sound motion picture projector which is expected to spur widespread use of 8mm. film techniques in the audio-visual industry.

The Kodak Sound 8 Projector

The Kodak Sound 8 Projector incorporates a complete system for recording and playing back magnetic sound on both old and new 8mm. film. It will give visual communications program directors in industry, government, education, and many other fields the opportunity to produce inexpensive 8mm. film packages — complete with commentary, music, or other sound effects — that can supplement more elaborate and costly 16mm. productions.

Kodak unveiled the new projector March 21 at the National Convention of the Master Photo Dealers and Finishers Association in St. Louis. Availability of a new Kodak Sonotrack Coating service for processed 8mm. Kodachrome film was announced at the same time.

The Sonotrack magnetic oxide coating is applied between the film edge and perforations of the processed film. The stripe receives the sound as it is recorded and stores it magnetically for subsequent playback.

Commentary is recorded by speaking into the microphone supplied with the projector as the film is projected. Music or other sound effects can also be added through use of a tape recorder or record player. A phono input connector cord is supplied with the projector. The sound track plays back when the film is projected again.

For detailed information pertaining to the Kodak Sound 8 Projector, please write.

(For further details encircle index code 0516)

(Continued on next page)

QUICK SERVICE
on SCHOOL SHOP LUMBER
GUARANTEED QUALITY

WE SPECIALIZE IN AMERICA'S FINEST APPALACHIAN HARDWOOD LUMBER FOR MODERN SCHOOL SHOPS

HARCO school shop lumber is *guaranteed* as to species, seasoning, texture and grade. We know the kind of lumber you need to turn out better finished products —and that is the kind we ship— *carefully packaged and properly kiln-dried* Appalachian Hardwoods.

Because of increased demand, we have expanded our facilities to maintain a larger inventory of a greater variety of woods—*ready to ship*. You get your order when you need it!

Get HARCO'S *guaranteed quality!* Get more usable board feet per order. Get better lumber that will give you better results. Let us quote on your requirements soon.

DIRECT TO SCHOOL SHIPMENTS

Wherever possible we ship directly to the school by commercial truck line. Safe, clean delivery is assured.

SEND FOR FREE CATALOG
Our catalog 60-S contains full information, including delivered prices. FREE on request.

MAIL US YOUR RUSH ORDER TODAY!

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Educational Lumber Division
P. O. Drawer 1091 — ASHEVILLE, N. C.

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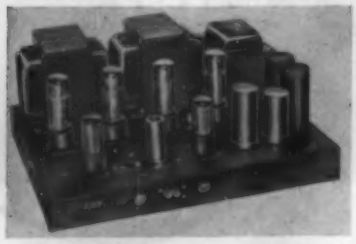
SHOP EQUIPMENT NEWS

(Continued from previous page)

EICO ANNOUNCES NEW AMPLIFIER

Electronic Instrument Co., Inc., have introduced their new Model HF-89 100-watt stereo high-fidelity dual-power amplifier which employs the very finest techniques known to the audio art. It combines superbly with EICO Model HF-85 Stereo Preamplifier or with any good stereo preamplifier. It is available in both kit and wired form.



EICO 100 Watt Dual Stereo Power Amplifier Model HF-89

Each power amplifier is conservatively rated at 50 watts and employs the thoroughly proven cathode-coupled phase inverter-driven circuit, preceded by a direct-coupled voltage amplifier. Ultra linear connected, fixed-biased, push-pull EL34's are used in the output stage and provision is made for both bias and dc balance adjustments. The very low impedance characteristic of silicon diode rectifiers gives the common power supply for the two amplifiers very good regulation. As a result, signal conditions in one amplifier have negligible effect on the operating conditions of the other amplifier—a very worthwhile feature in a high-quality design.

To insure long life for the silicon diode rectifiers, electrolytics, and tubes, a surgistor is included to limit the starting surge currents.

To obtain complete specifications and details, please write to Electronic Instrument Company.

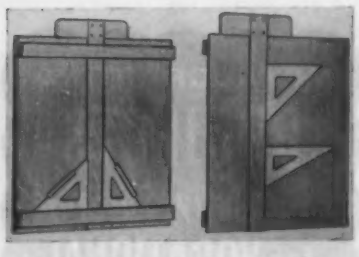
(For further details encircle index code 0517)

ALVIN HANDY DRAWING KITS

Alvin & Company, Inc., offers a choice of handy drawing kits in four popular sizes, ideal for school, shop, or office use. Compact, useful, and convenient for free-hand drawing, art, or mechanical drawing students, it may be employed in sketching and temporary layout work for both vocational and technical use.

These drawing kits include a lightweight basswood drawing board with finished fixed head, maple wood T square, and two transparent triangles, with finger lifts, one 45/90 deg., and the other 30/90 deg. A built-in T-square holder on the back of the board holds triangles in place when not in use.

The drawing kits are portable and compact for easy carrying. Each is supplied with waterproof, durable-plastic envelope jackets, and are available in sizes 10 by 12 in., 13 by 19 in., 17 by 22 in., and 19 by 25 in.



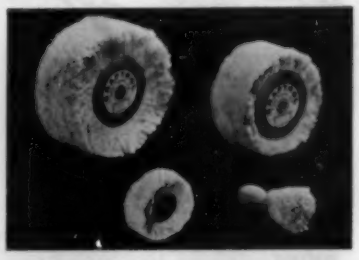
Alvin & Company Drawing Kits

For further information write to Alvin & Company, Inc.

(For further details encircle index code 0518)

NEW CRAFTOOL POLY-MOPS

The Poly-Mops introduced by Craftools, Inc., constitute a new concept in buffing wheels. They are designed for the silver worker, craftsman, jeweler, and school. They are particularly suited to applications on metals where an extremely high finish is required.



Craftool Buffing Wheels

The face of these wheels is formed by thousands of cotton tufts that are mounted in a solid wood core. The dense fillings of the mops assures a maximum efficiency and wear. The actual tufts are held in place by metal rings and cannot become detached even under severe wear.

The broad face of these wheels permits a large buffing area for best results in a minimum amount of time. Poly-Mops can be used with either tapered or straight spindles. They are furnished with 1-in. holes.

For further information and free catalog write Craftools, Inc.

(For further details encircle index code 0519)

NEW DORIC LETTERING SET

Keuffel & Esser Company have introduced an economy-priced lettering set, combining both upper- and lower-case letters and an adjustable scriber for slant lettering.

The new Model 8935 Doric Lettering Set has the complete lower-case alphabet in three popular sizes in addition to the standard capital letters, symbols, and numerals. Sizes offered are .10 in., .14 in., and .24 in. Letters that slant forward as much as 22 degrees may be produced with a simple adjustment of a screw on the scriber arm.

The set includes, in addition to the template and adjustable scriber, two sepa-

(Continued on page 94)

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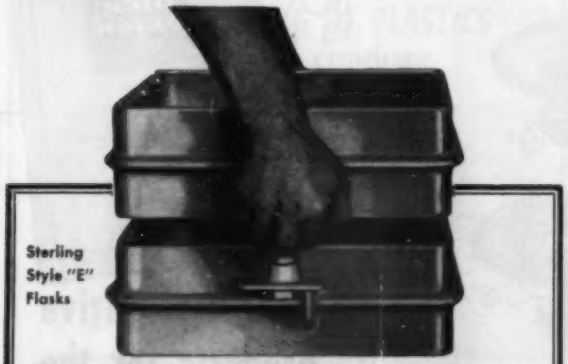

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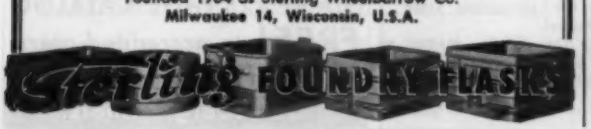

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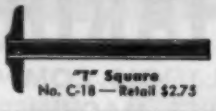

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Basswood Drawing Board
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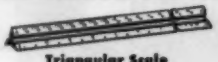

Triangular Scale
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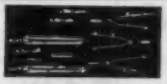

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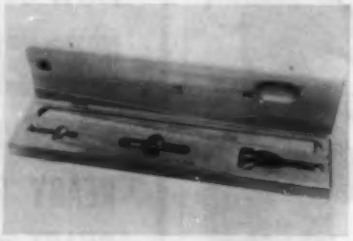
(Continued from page 92)



Model 8935 Doric Lettering Set

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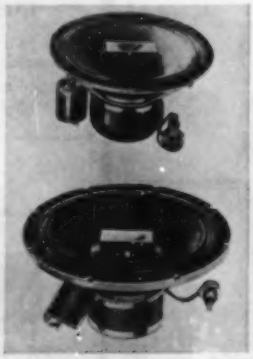
With Doric Lettering Sets, lettering is drawn entirely clear of the template, so that the work is in plain view at all times. There is no risk of smear or smudge.

Further information may be obtained by writing to the manufacturer.

(For further details encircle index code 0520)

KNIGHT HI-FI SPEAKERS HAVE ADVANCED FEATURES

Allied Radio Corporation announces the release of the new Knight KN-812A 12-in. 2-Way Hi-Fi Speaker and the new KN-815A 15-in. 2-Way Speaker. Built by British craftsmen to Allied's specifications, these speakers feature very heavy magnet structures of Alcomax III material; new rectangular exponential horn tweeter; and new mid-frequency radiator cone mounted in the center of the woofer.



Knight Hi-Fi Speakers

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In the KN-812A, the 3½-lb. magnet structure assures a high concentration of magnetic flux for distortion-free reproduc-

(Continued on page 96)

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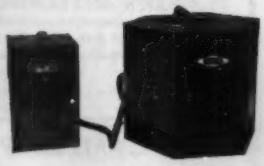

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SHOP EQUIPMENT NEWS

(Continued from page 92)

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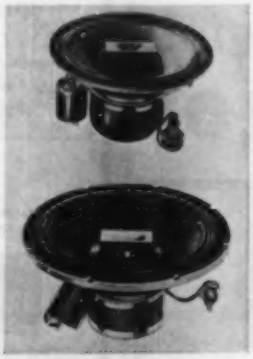

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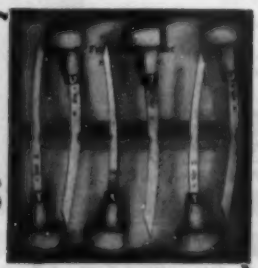

This set of 6 gravers, consists of 2 round No. 3 & No. 10, 2 flat No. 2 & No. 10, Lozenge No. 3 knife. Tools are slightly bent for clearance of hand to make it easier to work. Top Quality Steel. Blades will keep sharp, keen edge and give a lifetime of service.

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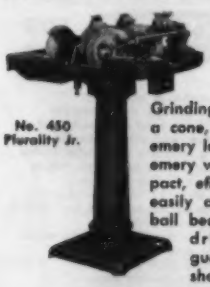

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SHOP EQUIPMENT NEWS

(Continued from page 94)

tion of powerful bass passages. New tweeter construction features wide-angle, high frequency dispersion. Free air resonance of the KN-812A is 35 cycles. Overall response is 30–20,000 cps.

The KN-815A features a 6¼-lb. magnet; has a free air resonance of 25 cycles; and overall frequency response is 20 to 20,000 cps. Like the KN-812A, impedance is 16 ohms and power handling capacity is 50 watts.

Both units are available from Allied Radio Corporation.

(For further details encircle index code 0521)

THE DI-ACRO BENDER

O'Neil-Irwin Manufacturing Company, producers of precision metalworking equipment, are the makers of the Di-Acro Bender.

The solid base casting and the hardened and ground steel mounting plate in the Di-Acro Bender, help to make this machine the fine tool it is. A smooth, easy-bending action turns on a ring of Torrington roller bearings to retain hair-width accuracy year after year.

The Di-Acro Bender will form a wide variety of shapes quickly, smoothly, with a minimum of setting up. You may make centered-eye and off-center bends, circles, zero radius bends, scrolls, squares, coils, loops, and spirals with attachments furnished in *Bend-R-Pak*. Additional attachments can be made up readily as a part of student project development.

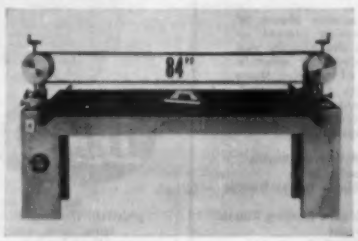
The bending procedures learned by the student on a rotary-type Di-Acro Bender are those used by industry.

Please write for details of the five models available.

(For further details encircle index code 0522)

NEW MODEL BELT SANDER-FINISHER

Boice-Crane Company have added to their power tool line a new large capacity model Hand-Stroke Belt Sander-Finisher for finishing wood, ferrous and nonferrous metals, and plastics.



Model Belt Sander-Finisher

The new belt-sander finisher, which fills the demand for a larger and faster belt abrasive machine, has a reciprocating worktable with more than double the area of its preceding model. The table measures 84 by 28 in. The new model is suitable for finish sanding assembled doors in the building trades, and some of the largest steel sheets in the fabricating field. One of the first installations is satin-finishing large stainless steel panels for passenger elevator car.

55c

Your allowance stays handy in a GALAXY Coin Purse. Whether on a belt or in a handbag, its gleaming aluminum cover will catch your eye. Size, 4" x 2". Kit Complete. Aluminum pre-cut; lacing holes punched. Zipper stitched. Pattern, instructions, lacing, cowhide lining and 1" black leather gusset included. Easy To Make, Easy to Decorate. 50c ea. plus 5c for lace and postage.

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Chicago 8, Illinois

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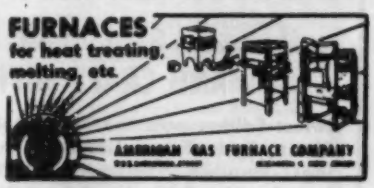

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COPE'S CATALOG OF PLASTICS AND CRAFT SUPPLIES

Latest Edition puts the Finest Selection of Plastic Sheets, Rods, Tubes, Liquids, Films — Tools — Findings—Manuals—Project Ideas at Your Fingertips... Includes Money-Saving School Discount Schedule!

No matter what your requirements — from cut-to-size pieces of Plexiglas to versatile, laboratory-type plastics forming presses — COPE'S CATALOG makes the job of obtaining all the plastics you need for industrial arts courses easy and convenient! It offers a DEPENDABLE SINGLE SOURCE for the hundreds of plastics items used in the school shop (some of which you see listed below), and contains information on applications and characteristics which you'll find helpful. Send today for your copy, and remember — at COPE you get same day service, lowest prices!

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FREE! Step-by-step instruction sheets for distribution to students telling how to make Decorative Fiberglas Bowls and Internal Carvings. Write on school letterhead stating quantity of each you need.

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Highway 100 Godfrey, Illinois
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FOR SHOP and LABORATORY
high quality—low cost—designed as *teaching tools*

TEMCO **TYPE 1600**

An ideal unit for giving practical training in heat treating tools, dies, small parts. Also excellent for laboratory testing. Ruggedly built . . . fast heating . . . operating temperatures to 1650° F. continuous, 1900° F. intermittent. Available without controls or with choice of various types of controllers. Two chamber sizes: 5½" W, 4⅞" H, 9" D . . . $157.50 without controls, or 5½" W, 4⅞" H, 13½" D . . . $177.50 without controls.

THERMOLYNE **TYPE 2100**

Six functional accessory groups let this multi-purpose furnace be used as a salt bath, oil bath, melting, air-heating, drying, crucible or vertical muffle furnace. Compact shape, triple insulation. Top loading . . . 6½" dia., 11½" deep chamber. Operating temperatures to 1650° F. continuous, 1900° F. intermittent. Basic furnace without accessories or controls, $170. Accessory groups from $22.75.

Other furnaces available in wide range of sizes and prices, with or without built-in controls, temperatures to 2300° F.

Write for literature and name of nearest dealer.

THERMO ELECTRIC MFG. CO.
473 Huff Street, Dubuque, Iowa

In the field of metal finishing, research has resulted in abrasives which perform best at speeds of around 4000 s.f.m. To provide for such increased speeds, Boice-Crane has adopted turned, balanced aluminum drums for the new model.

Both Boice-Crane models are available with individual dust-collector systems, or with collector hood ready to connect to a plant-wide system. An optional, rigid, auxiliary worktable is available for small parts finishing.

Please write for additional information.

(For further details encircle index code 0523)

Descriptive Material...

BRODHEAD-GARRETT 1960 CATALOG

The newest edition of the Brodhead-Garrett Company Catalog has made its appearance. This complete listing of supplies and equipment for industrial arts, vocational education, crafts, and fine arts, gives information on more than 15,000 items. Dozens of new items are included.

A general listing encompasses such equipment as benches, machinery, lumber, tools, mechanical-drawing needs, metal, hardware, finishing supplies, electrical supplies, graphic arts, welding equipment, ceramics, brushes, and art furniture.

A 23-page fast index at the back of the catalog provides a quick and easy reference to the materials that are available.

The concluding page of the catalog gives complete instructions on the diversity of Brodhead-Garrett stock, shipments, prices, terms, minimum orders, and service to be obtained. A complete guarantee covers any purchases made from this book.

(For further details encircle index code 0524)

ELECTRIC CERAMIC KILNS

The Electric Hotpack Co., Inc., have made available their new 15-page booklet which illustrates and describes the latest in quick-firing kilns and kiln temperature controls.

Units feature tongue-and-groove firebrick insulation, simplified and convenient controls including large face pyrometer and automatic overtemperature device. Twelve models are shown.

Catalog available upon request.

(For further details encircle index code 0525)

SKIL POWER TOOLS CATALOG

The 1960 Skil Catalog for the "500" line of consumer power tools for the do-it-yourselfer and hobbyist, has 24 pages in three-color printing.

Skil's 1960 catalog of industrial-automotive tools contains 64 pages of illustrations and product listings.

Copies available upon request from Skil Corporation.

(For further details encircle index code 0526)

BULLETIN DESCRIBES NEW DELTA RADIAL DRILL PRESS

The Radial Drill Press, a new drilling tool that can drill to the center or at any point on a 32-in. square, is described in a new two-color, photo-illustrated bulletin issued by Rockwell Manufacturing Company's Delta Power Tool Division.

Large capacity, adaptability to all types of drilling and versatility are the major advantages of the new tool. In addition to drilling, it can also do sanding, shaping, routing, and many other operations.

The versatility of the new radial drill press is further augmented by the choice of four speeds, 700, 1250, 2400, and 4700 r.p.m., for drilling a variety of materials. Up front controls facilitate operation.

The bulletin includes 12 close-up photographs illustrating various operations, catalog listings, and specifications.

Ask for a copy of Bulletin AD-1222.

(For further details encircle index code 0527)

NEW CATALOG

Goodheart-Wilcox Company have recently issued their new catalog of books helpful to teachers of drafting, automotive training, carpentry and woodworking, painting and decorating, refrigeration, welding, freehand lettering, plastics, house wiring, sheet metal die design, vocational mathematics, and also hobby crafts.

Catalog available upon request.

(For further details encircle index code 0528)

(Continued on next page)

TEACH CERAMICS THE EASY WAY!

CERAMICHROME, the original one-fire ceramic colors, can help you teach ceramics the *easy* way...the **CERAMICHROME** way! No messy mixing! Brush it on...fire it! Perfect results time after time. The whole story is in the information packed booklet, "Teach Ceramics the Easy Way." You'll find tips on forming ceramic classes easily and economically, techniques of glazing and decorating, and other valuable data. Send for your *free* copy today. Please include name and address of school where you are now teaching.

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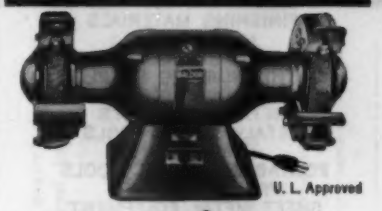

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Baldor GRINDERS

Baldor's "student-styled" grinders provide maximum safety in the hands of young, inexperienced users. Slow speed (1725 RPM) avoids spoilage . . . builds confidence . . . helps student do better work. Perfect for plastics, cellulose materials, soft metals. Also available in convential speed (3450 RPM). Other advantages include:

- **Flanges, wheels, shafts meet American Standard Safety Code requirements!**
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Write for Bulletin 321P on complete line of Baldor Grinders and Buffers!

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Mosaics

Imported ceramic or glass tiles make beautiful mosaic designs.

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150 colors to choose from in ceramic glass and porcelain Italian tiles. Our illustrated catalog suggests creative art activities. Catalog includes Marquetry, Metal Tooling and Etching, Plastic Plants and Flowers.

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Kiln and Hundreds of Projects in our ENAMEL-on-COPPER IDEA BOOK
- New Ideas for Copper and Complete Jewelry Findings for Coronation.
- Many new Classroom Projects.

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Your Idea Book and Kiln information will be rushed to you.

INCLUDING A NEW ART

Glass Firing

From ordinary plate glass you can create the most beautiful jewelry, dishes, bowls, mobiles, ornaments.

Catalog includes precut glass jewelry shapes, decorating mediums, cast your own mold material, other ideas.

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FOR THE SCHOOL SHOP

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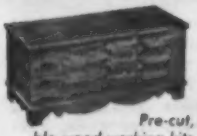
HAND TOOLS
HARDWARE
LEATHERWORKING SUPPLIES
MACHINE TOOLS
METALCRAFT TOOLS
METALWORKING TOOLS
METALS
PORTABLE ELECTRIC TOOLS
PRECISION TOOLS
SHEET METAL EQUIPMENT
WELDING EQUIPMENT

PATTERSON BROTHERS



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Pre-cut, ready-to-assemble wood-working kits of every description. Over 60 to choose from. Cedar chests, gun racks, tables, water skis, archery sets, bedroom suites and many others.

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LATEX MOLDS	Liquid MARBLE	DESIGNS
Liquid LUCITE	PORCELIZING	Liquid FOAM RUBBER

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REASONABLE prices on all items. Since 1910.

— WRITE FOR CATALOG —

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(DIVISION OF SAX BROS., INC.)
Dept. IN, 1101 N. 3rd St., Milwaukee, Wis.

Personal News from Industry . . .

BLACK & DECKER APPOINTMENTS

J. R. Steffey has been named I-A District Manager of the Pittsburgh territory, taking the place of T. H. Maddux, who was recently named Central Regional Sales Manager, I-A Division.

P. W. Boyle has been named I-A District Manager of the Boston territory, replacing J. H. Schmidt, who has been named Director of Marketing Services.

F. T. Clark has been named I-A District Manager of the Philadelphia territory, and replaces P. W. Boyle.

E. D. Krimski has been named sales representative in the Baltimore District, to take the place of Mr. Steffey. Mr. Krimski was formerly in the Marketing Division at Towson.

STANLEY TOOLS REPRESENTATIVE

Irving H. Grout has been appointed representative of Educational Department in the Maryland, Virginia, West Virginia, North Carolina, and Washington, D. C., territory for Stanley Tools, division of The Stanley Works, New Britain, Conn.

STARRETT OPENS NEW BRANCH OFFICE AND WAREHOUSE

The L. S. Starrett Company announces the opening of a new Los Angeles branch office and warehouse at 5946 East Washington Blvd., Los Angeles, Calif.

Complete stocks of Starrett hand and power hack saws, metal cutting band saws, high speed steel metal cutting band saws, hole saws, low carbon precision ground flat stock, oil hardening precision ground flat stock and air hardening precision ground flat stock are now warehoused in the new building for prompt replenishment of distributors' local stocks.

AMF DeWALT APPOINTS GENERAL SALES MANAGER

A. E. Richardson, Jr., has been appointed general sales manager of Dewalt Division, American Machine & Foundry Company, originator of radial-arm power tools.

Mr. Richardson will succeed Truman Jones, recently elected vice-president in charge of special projects to coordinate all government sales and national accounts.

In his new capacity, Mr. Richardson will assume responsibility for all home office and field sales activity, both within the U. S., and Canada.

BORDEN COMPANY ACQUIRES NEW UNIT

The Borden Company has acquired the business of the Commercial Ink and Lacquer Company of Fair Lawn, N. J., and Whitehouse, Ohio, it was announced recently.

The new unit will be formally known as the Ink and Lacquer Department of The Borden Chemical Company, a division of the Borden Company.

In acquiring this company, Borden Chemical Company will now be able to supply the paper converter field with a complete line of products, namely, adhesives for laminating, adhesives for fabrication, chemicals for coating, and now inks for printing paper.

New Catalog of fresh ideas
for project activities in plastics, ceramics, leather, wood, metal.
Handsome desk and project accessories — desk fountain pens, desk balls pens and pencils, swivel-funnel-holders, plus many new items!
Gilbert & Miller

FREE WOODWORKING CATALOG

FREE TO INSTRUCTORS — All-New 1960 Edition of Constantino's Woodworking Catalog & Manual! Contains everything students need to work with wood, *at extra special discounts!* Since 1913, world's largest source of finest rare woods, wood finishing materials and tools. Hard-to-get items for industrial arts, hard-to-find hardware, table legs, instruction books, etc. Instructors: write on school letterhead for FREE Catalog.

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2050 Eastchester Rd., Dept. E-9, New York 61, N. Y.

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SPECIAL 2608K Pocket Drawing Kit. Contains 6" Bow Compass — 5½" Friction Divider and spare parts tube in Vinyl plastic pocket flap case $3.30 ea. $36 doz.

Drawing Sets
Drafting Instruments
Designing Aids
Drafting Material
Drawing Equipment
Shop Tools
Craft Supplies

Write for FREE Catalog Today!
MODERN SCHOOL SUPPLIES
For the Graphic and Industrial Arts
FREE DELIVERY

SHOP TEACHERS

Complete stock of lamp parts for your lamp projects shown in our catalog. Also contains charts and instructions for building and wiring lamps. These valuable instructions and catalog sent for 25¢.

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REED, RAPHIA
HANDICRAFT SUPPLIES
SEND FOR CATALOG
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Chicago, Ill.

READER'S SERVICE SECTION

INDEX TO SHOP EQUIPMENT

The index and digest of advertisements below are provided for your convenience in requesting free product information, catalogs and literature offered by the advertisers and the manufacturers listed in Shop Equipment News. To obtain this information or literature, encircle code numbers, sign the card, and mail. Your request will receive prompt attention.

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USE THESE CARDS

These cards are provided for the convenience of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION readers in requesting information on products, services, booklists, and catalogs offered by the advertisers in this issue.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION May, 1960
400 North Broadway, Milwaukee 1, Wisconsin

Please ask the manufacturers, whose code numbers I have encircled, to send me the information, catalogs, or product literature offered in this issue.

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NEW SUPPLIES AND EQUIPMENT

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NAME _____ (Please print) _____ POSITION _____

SCHOOL _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

HAVE YOU SIGNED YOUR NAME AND ADDRESS?

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION May, 1960
400 North Broadway, Milwaukee 1, Wisconsin

Please ask the manufacturers, whose code numbers I have encircled, to send me the information, catalogs, or product literature offered in this issue.

ADVERTISING INDEX

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NEW SUPPLIES AND EQUIPMENT

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0502	0504	0506	0508	0510	0512	0514	0516	0518	0520	0522	0524

NAME _____ (Please print) _____ POSITION _____

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